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Byzantine Art

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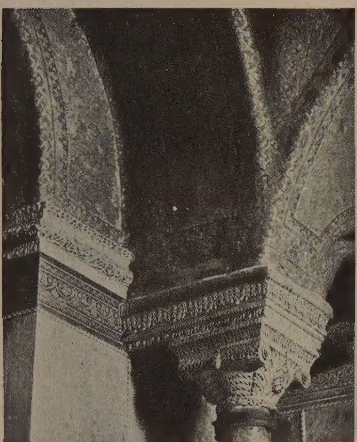
Princeton University

HAGIA SOPHIA

IT was a little less than fourteen centuries ago that Justinian, emperor of the eastern empire, proceeded in solemn state to the church of Hagia Sophia, then newly finished and awaiting dedication. It is related that he walked hand in hand with the patriarch of Constantinople until he reached the royal doors that open into the nave, and then, dropping the patriarch's hand, he hastened on alone to the pulpit, extended his arms, and cried: "Glory to God who has deemed me worthy of fulfilling such a work. O Solomon, I have surpassed thee!"


Detail of vaults and capital, Santa Sophia, Constantinople

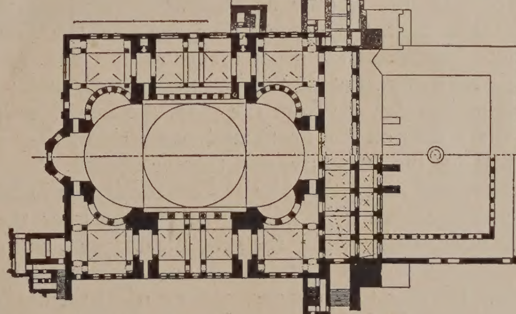
There is no doubt that he had built a greater temple than Solomon's. We shall see later that his architects in one respect outdid the creations of antiquity, and those of modern times as well. Certainly at least they had created a work unique in the history of architecture, in that it stands on the border line between the antique and the mediæval.

There are some who assert that Hagia Sophia is the last creation of Hellenic architecture, while others see in it the first pure example of Byzantine. It is like that other landmark of the passing of the ancient world, Pope Gregory the Great of Rome, whose contemporaries called him the "last of the Romans," and whose successors looked upon him as a founder of the mediæval church.

The plan of a great metropolitan church at Constantinople originated with Constantine the Great, who meant to build it, and left, it is said, a solemn injunction to his son Constantius that the project should be carried out. Constantius built the church accordingly, and it was dedicated in 360 merely under the name of "the great church." As time went on, however, it acquired a new consecration to the "immortal wisdom of Christ," and this title, shortened to "Holy Wisdom," or *Hagia Sophia*, passed on to the grander structure which succeeded it.

Constantius's church is known to us from descriptions, and was of the basilica type, with wooden pitched roof, clearstory, and side aisles. It was burned by a mob within fifty years from its dedication. Theodosius II rebuilt it in 415, and his church lasted over a century, only to be burned in the terrible *Nika* riot of 532, which almost overturned the throne of Justinian.

The riot over, Justinian commenced the new church, the Hagia Sophia we know, 39 days after the fire. This shows that the plans for the church were already prepared at the time of the riot and the fire, for so complicated a design as that of Hagia Sophia could not have been worked out from the beginning in so short a time. The work was pushed on the grand scale which Justinian's enterprises always assumed; we hear of 100 foremen, each with a hundred men, 10,000 in all, and divided into two sections, with 50 foremen and their followers conducting the northern half of the building, the other 50 the southern half. Three hundred and twenty thousand pounds of gold, *by weight*, are said to have been expended, equal in our money now to $65,000,000. Gibbon thinks this is impossible, and suggests $5,000,000 as the probable cost, but later investigators, impressed with the unheard-of luxury of the interior decoration, are beginning to believe that the old tradition is nearer the correct figure.


SANTA SOPHIA, CONSTANTINOPLE
PLANS OF BYZANTINE CHURCHES

The first architect of Hagia Sophia was Anthemius, from Tralles, on the west coast of Asia Minor. He was assisted in the work by a brother architect of Miletos named


Exterior, Santa Sophia, Constantinople.

Isidoros. The position of Anthemius in Constantinople was not unlike that of Pheidias at Athens under Perikles, for he was not only the architect at Hagia Sophia, but general director as well of all building and engineering operations throughout the eastern capital—a position of no mean responsibility under so industrious a builder as Justinian. Both Anthemius and Isidoros were pupils of Proclus, a mathematician of the early sixth century, and one can see very plainly the abstraction and subtlety of the trained mathematical mind in the exact dimensions of the church and the narrow gauging of the strains whereby Anthemius raised his dome in the air. I say "narrow" advisedly, for, as we shall see, the architect left too slight a margin of safety in the span of the arches that support the dome to east and west, and the lack of strength at this point occasioned a series of catastrophes which began in his own lifetime and never ended till the fourteenth century.

We can see from the plan that the construction of Hagia Sophia centres in the four great piers of the nave. On these are raised four great arches, and on their summits is poised the dome. On the axis, east and west, the dome is buttressed by half-domes, breaking into three smaller half-domes at the east and two at the west. The side aisles are in two stories, each covered with a ceiling consisting of large cross-vaults and small tunnel-vaults, the roofs thereof reaching, you will notice, only as high as the springing of the arches that bear the dome. The roofs of the side aisles therefore buttressed the great arches at east and west only at their springing, not at the haunch as well, and as these arches, as you can see from the plan, are far wider in span than the arches on the north and south sides, they proved too weak for the structure, and trouble ensued.

There was an earthquake at Constantinople in 553, and another more violent in 557. Five months later the great eastern arch, weakened by the shocks, collapsed, and carried the sanctuary with it in ruin. A new architect was tried, this time Isidoros the younger, nephew of Anthemius's associate. He repaired the damage by strengthening the arches and buttressing them, and also made the more important change of raising Anthemius's dome about 20 feet, which materially decreased its outward thrust. His work stood for over four centuries, and then the earthquake of 989 threw down the western half-dome. The east and west arches showed signs again of weakness in 1317, and it was then that the unsightly exterior buttresses were introduced, but apparently with bad adjustment, for the eastern vaults fell in again in 1346, in consequence of an earthquake two years before. The church was finally repaired in 1356, and has lasted in the form it then assumed until the present day.

The first collapse of 557 made a tremendous impression on Constantinople; and it made a more lasting one upon the Byzantine architects, for they never again tried to crown their churches with a single central dome on so large a scale, contenting themselves with a series of small domes more or less symmetrically arranged. This multiplying of the domes is also the reaction of the later Byzantine architect against the Greek unity and proportion of Anthemius's church. His dome has no rival within the structure, and its high and wide expanse is the natural culmination of the interior which is scarcely equalled by any other in spaciousness. The floor area is somewhat less than that of St. Peter's at Rome, but larger than that of St. Paul's at London, and the central space covered by the dome is wider than the nave of either building.

The church is 300 Byzantine feet long, and 100 feet wide between the piers on the east and west sides of the central square. But on the north and south sides the distance between these piers is only 72 feet, and this is the real span also of the arches raised upon them, which explains why the north and south arches were able to resist the strains that caused the collapse of the mightier spans to east and west. But Anthemius deceives the observer here, for the real arch is concealed in the masonry of the wall, and what the eye sees is a moulding of much wider span, measuring in fact 100 feet, like the arches of the east and west, so that to all appearance all four of the arches are equal, and spring from the angles of a perfect square. Anthemius was evidently afraid of his lateral arches, because they lacked support; the chances he took with the wider spans to east and west were based on the belief that the dome to east and west was sufficiently braced by the half-domes beneath. Here, he thought, dimensions could be played with. Hence the wide span of the eastern and western piers, the weakening of the construction, and the subsequent disaster.

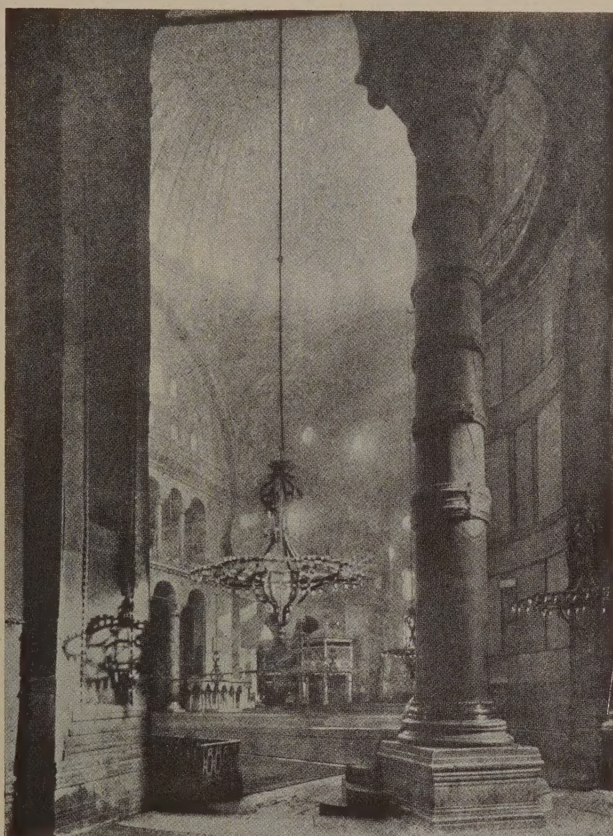
We may pardon Anthemius his mistake in admiration of his audacity. No one had poised a dome on four arches before in such dimensions. But there are churches earlier than Hagia Sophia, in his native Asia Minor, where the experiment had been tried on a smaller scale, and if we review the history of late classic construction, we can see the gradual evolution of the form.

Let us go back, to find the genesis of Anthemius's idea, to the building methods of the Romans. We know that the Romans were the first to use the arch extensively, and it did not take them long to realize its further applications. Thus from a series of arches they made the tunnel-vault, and from the intersection of two tunnel-vaults they arrived at the groined or cross-vault. Building these first in stone, they found a difficulty when they came to use cross-vaults over large spaces, because the groins of a cross-vault are elliptical so long as its crown is level with the lateral arches, and if the cross-vault is very large the ellipse gets so flat that the vault falls in.

The Roman builders solved this problem and all other difficulties of vaulting as our modern builders do—by using concrete. Their concrete was exceptionally good, and when it had set, the vaults were so many inverted bowls of practically solid stone, so that thrust was minimized, and vast spaces could be roofed over with very flat cross-vaults. Such, for example, were the three great cross-vaults of the Baths of Caracalla at Rome of the early third century, cov-

ering the tepidarium, and imitated in the concourse of the Pennsylvania Station at New York. Another concrete construction of the kind is the dome of the Pantheon at Rome. But these concrete vaults demanded a vast amount of wooden centring, besides a framework of brick arches into which the concrete could be poured in sections, much resembling the steel armature that precedes the application of concrete in the ceilings of modern buildings. As Roman civilization decayed, the secret of this monolithic brick-and-concrete construction was gradually lost; the last building in Rome that shows it is the Basilica of Maxentius of about 300 A. D.

So it comes about that when the Christian house of worship makes its rather modest appearance in the fourth century, the Roman concrete construction was already a memory of the past. The forms remained: the tunnel-vaults, cross-vaults, and domes—but no one knew how to make them with concrete. Hence buildings of any size were now roofed with wood, and only small areas were covered with vaulting. Such vaulting as there was now took the form of purely brick construction, laid up with the original principle of masonry arches, with all the risks of thrust and buckling that this implied. Hence the builders of vaults avoided the old Roman cross-vault with its elliptical groin, and confined themselves to the tunnel-vault with its semicircular arches, or the dome. The dome is the form of vaulting that has least thrust, and was therefore preferred in general to the tunnel-vault.



Interior with central dome, from aisle, Santa Sophia, Constantinople.

But against the use of the dome there arose the grave objection that it was ill adapted to the interior of the early Christian church. And the interior of the church, as in all late classic buildings, is all that really counts; exteriors, as you have probably noticed in the pictures I have shown you of Hagia Sophia itself, are simply the casual result of the arrangements inside, and are not composed for their own effect. This generalization can in fact be made with reference to late classic building, from the second century on, that the æsthetic effect which in a Greek temple is limited to the external porch is now transferred to the interior of the building. Indeed, the early Christian church is really a temple turned outside in, the colonnades of the porch appearing now as the dividing element between the nave and the side aisles.

Now the dome had never been used by the Romans, even with the advantage of concrete construction, on an oblong structure of this character. They raised their domes on circular plan alone, as in the case of the Pantheon, and for rectangular plans they employed a series of cross-vaults, as in the Baths of Caracalla. The early Christian church, moreover, demands a horizontal and longitudinal axis; the eye of the worshipper must be carried forward toward the sanctuary and the altar. The dome instead involves a vertical axis, and a plan that radiates from the centre. The early Christian builders, then, having no concrete with which to construct extensive cross-vaults, were faced by the dilemma of either keeping the oblong plan of the church and roofing it with wood, or sacrificing the longitudinal plan for a central one, and roofing with a dome.

In the western empire they preferred to keep the oblong plan, and thus evolved the early Christian basilica, so called from its resemblance to the basilicas which the Romans built to house their law-courts and for other public purposes. The wooden roof over the nave is raised above the roofs of the side aisles in order to provide a space of wall called the clear-story, in which windows could be pierced to light the interior; the side aisles are half the width of the nave, and separated by a row of columns. At the east end is a semicircular projection called the apse, where the altar is placed, and where also the interest and the composition of the whole interior is concentrated. This became in a way the official form of Christian church. It was the form assumed, you will remember, by the church of Constantius, which preceded Anthemius's structure. It was the form used by Constantine the Great in most of the churches built by him in Rome and the Holy Land in the early fourth century. It is variously known as the Hellenistic, Latin, or basilica type of church.

As I said before, the basilica type was the customary form of Christian church in the western empire, and having, as it were, the seal of approval on the part of the authorities, it was also used in the east. But along with it in the eastern provinces we find here and there a revival of vaulting, sometimes in the form of tunnel-vaults substituted for the wooden roof over the nave and aisles, but more often in the form of the dome. These domes appear in Asia Minor, Syria, and Egypt, as well as the Balkan peninsula, where builders were learning from Persia a new method of laying up brick vaults that did not require the elaborate wooden centring of the Romans. It consists of laying the bricks flat on their faces instead of on edge; the ancient bricks were large and square, so that the broad surface by this method could be stuck to a layer of mortar, and would hold until the arch was completed. But such vaults are not concrete, and have the thrusts of stone construction; hence these eastern builders took no chances, as we may see from the conical section of the dome on the vaulted churches in Syria. By making the dome high and vertical the builder avoided too much outward thrust.

To adapt their domes to the Christian service, *i. e.*, to

approximate as nearly as they could the basilica plan, these eastern builders changed the old Roman circular plan to an octagon. The transition of the round dome to the polygon was secured in various ways, sometimes by merely placing stones across the corners of the octagon; more often by the use of "squinches," or arches that spanned the angle. This is the method used at S. Vitale in Ravenna in Italy, undoubtedly built by an eastern architect, and again in SS. Sergius and Bacchus at Constantinople. Here the planner has succeeded in further approximating the oblong effect of the basilica by throwing out niches at the corner sides of his octagon. In all of these churches the longitudinal axis is faintly realized by the insertion of a small choir on one of the eight sides.

Finally comes the square. There is no use trying to put a dome directly on a square, and the architects of Asia Minor and Greece who used this plan devised a new and epoch-making architectural form when they raised arches on the sides of the square, and poised their dome on these, filling up the intervening angles between the arches with spherical triangles of masonry, or pendentives. This was tried with small cupolas in some Asia Minor churches before the time of Anthemius; its most conspicuous example is the church of Holy Wisdom at Salonika, where we find the prototype of Hagia Sophia, but with the important difference that the side aisles are raised to buttress the dome at its springing, so that the side walls of the nave could not be used for windows. There is also in this church the objectionable feature of the radiating plan, the disposition of the building centres under the dome, and this forms a contradiction to the longitudinal axis suggested by the placing of the altar at one end of the church.

Anthemius solved these difficulties by boldly introducing the basilica plan into his church. The irritating central effect of the preceding experiments with the octagon and square is disposed of by making the block of the church 300 feet by 230. The longitudinal axis is further emphasized by opening out the two great half-domes to east and west only, and a decisive touch is given by the three smaller half-domes that carry the vaulting down to the eastern end, while at the western end we have but two half-domes, with the third cut off by the entrance vestibule, or narthex. Feeling certain that he had furnished sufficient support for the dome at the east and west by this succession of half-dome buttresses, Anthemius narrowed the arches on the north and south sides, as we have seen, and, trusting to their ability to stand alone as thus reduced (as they did), he introduced his innovation of the clearstory wall, keeping the vaults of his side aisles far below the dome, and piercing the side walls, thus freed, with windows. He thus succeeds in combining the majestic vaulting of the dome with the basilica type of church, retains the oblong plan essential to the Christian service, and lights his interior magnificently with vast windowed walls.

Hagia Sophia is built upon the southwestern slope of the plateau which occupies the extremity of the peninsula of Constantinople. It has been supposed that the curious inclination of the axis of the church to the south of east was due to the necessity of making this axis conform to the orientation of the other structures to the south of it, but it does not so conform, strictly speaking, and Antoniades's theory, accounting for the deviation of the axis, is very convincing. A Christian church of the sixth century was supposed to have its apse due east. The axis of Hagia Sophia deviates a bit over 33′ to the south of east. This almost corresponds to the situation of the rising sun at the time of the winter solstice. On Christmas Day the sun rose in the reign of Justinian at a point 31′ 41″ south of east, but as a matter of fact it became visible over the mountains of Asia Minor across the Bosphorus at a point still farther south, and almost corresponding to the point on the horizon to which the axis of Hagia Sophia is directed. There can be little doubt that the church was meant to point toward the sun that rose on Christ's birthday. "I am the Light of the World" is written on the book the Saviour holds in the mosaic over the Royal Doorway; the Christmas sunrise symbolized the Son of God, illuminating the world by his word.

South of the church was the imperial palace, and on great feast-days the emperor went in solemn procession from the palace through the "Bronze Gate," across the colonnaded plaza known as the Augusteum, into the narthex, or vestibule of the church, entering the interior by the great central doors known as the "royal portal." To see the interior with Justinian's eye we must remove the mihrab of the Moslems in the sanctuary, the Sultan's loge, and the various other Mohammedan intrusions, and restore instead the delicate openwork of the bronze grill that separated the sanctuary from the body of the church, the marble pulpit, the great communion-table, and the patriarch's throne in the apse. We should also remove the quotations from the Koran that disfigure the piers, and have replaced the great mosaic bust of Christ in the central dome. But aside from covering up the mosaics that have living figures in them, after the requirement of the Koran, the Moslems have not hurt the church a great deal—the despoiling of Hagia Sophia was done by Christians, not by infidels, and its treasures of gold, silver, and bronze were carried off by the Crusaders at the time of the Latin conquest of Constantinople. It was then that the bronze iconostasis was lost, and the silver sheathing of the royal doors, as well as the wood of the doors themselves—a very precious wood, being a portion of the timbers of the Ark. One of these crusading vandals is still here, the Doge Dandolo, of Venice, who died during the conquest and is buried in Hagia Sophia.

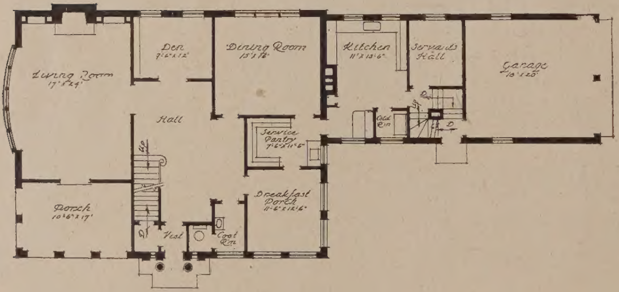
Enough is left to dazzle the eye with color. There are 104 monolithic columns used in the interior, of red porphyry from Egypt, green Molossian marble from Thessaly, and the white varieties of Asia Minor and Greece. Bronze bands encircle them at top and bottom and sometimes on the shaft, to strengthen them for their task of supporting arch and vault. Their capitals, too, have changed from the original Ionic and Corinthian forms to shapes more useful for their new employment; projecting volutes and leaves are eliminated, and the capital contracts into a simple block, or spreads itself into an oblong to better meet the imposts of the arches.

(*To be continued*)

RESIDENCE, F. B. STEELE, UTICA, N. Y.

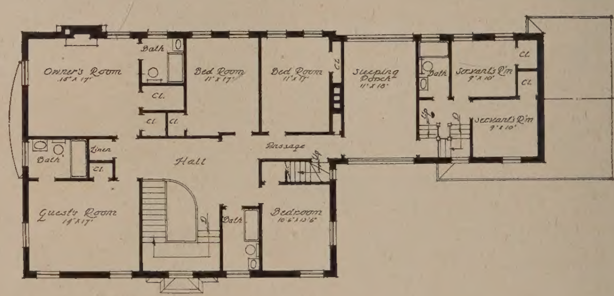
Bagg & Newkirk, Architects.

LIBRARY.



First Floor Plan

Residence of Mr. F. B. Steele, Utica, N.Y.
Bagg & Newkirk, Architects.



Second Floor Plan

RESIDENCE, F. B. STEELE, UTICA, N. Y.

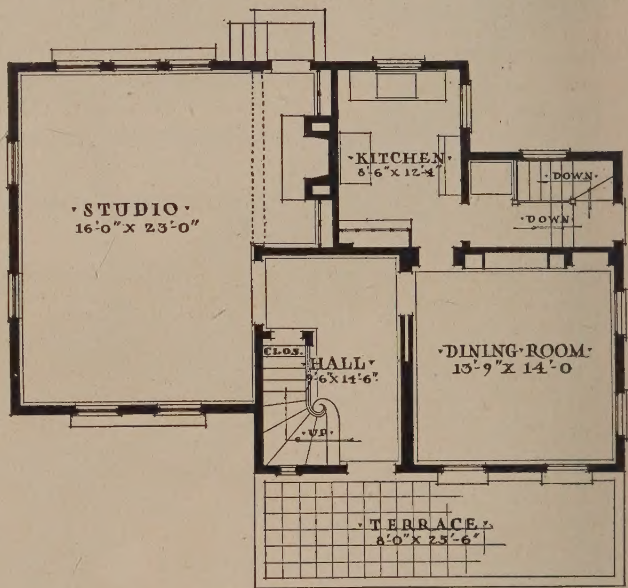
Bagg & Newkirk, Architects.

A. Wallace McCrea, Architect.

RESIDENCE, HANS FOY, BEECHHURST, LONG ISLAND.

STUDIO.

HALL.



FIRST FLOOR PLAN

A. Wallace McCrea, Architect.

RESIDENCE, HANS FOY, BEECHHURST, LONG ISLAND.

The Building for the American Academy of Arts and Letters

McKim, Mead & White, Architects

THE building for the American Academy of Arts and Letters forms part of the group erected on the block bounded by Broadway, 155th and 156th Streets, which includes the buildings for the Hispanic, American Indian, Numismatic, and Geographical Societies, and the Spanish Church.

The general plan and arrangement of the building are influenced greatly by its situation on the slope of the hill facing the Hudson. This makes necessary two entrances of equal importance, one to the lower level on 155th Street and the other on the level of the terrace, access to which is from Broadway. Of the group of buildings above alluded to, facing upon this terrace, that for the Academy of Arts and Letters is at the western end.

The lot is 100 feet wide on 155th Street and about 83 feet 8 inches deep. The difference in level of the two façades results in there being three stories on the street and one story on the terrace leading from Broadway.

The façades are built of Indiana limestone, are Italian in style, and are arranged to conform in certain principal lines with the adjoining Numismatic Museum. The principal, or street, façade consists of two superimposed orders, the lower containing the basement and first story, the upper containing the third, or principal story, entrance to which is directly from the terrace. The lower order is Doric and rusticated, with the windows of the first story arched. The upper order is Ionic, with engaged columns and pedimented windows between.

The building is surmounted by a balustrade. The basement, which is entered directly from the street, by the principal portal, contains the executive offices of the institution, flanking the main corridor, which leads to the elevator and vaulted staircase, giving access to the upper floors.

The first floor is largely taken up by the Academy meeting-room and the library. The Academy meeting-room has windows on 155th Street, looking south, and is fitted with chairs for the fifty members of the Academy, placed in successively rising slightly curved rows, and facing the platform to be occupied by the president of the society. This room is 30 feet wide by 41 feet long. The walls are panelled in wood to the height of nine feet, and above this wainscoting the space is left, up to the level of the cornice, for mural decoration. The frieze running around the room contains an inscription, and the ceiling is flat, with panels decorated and colored in the Italian manner.

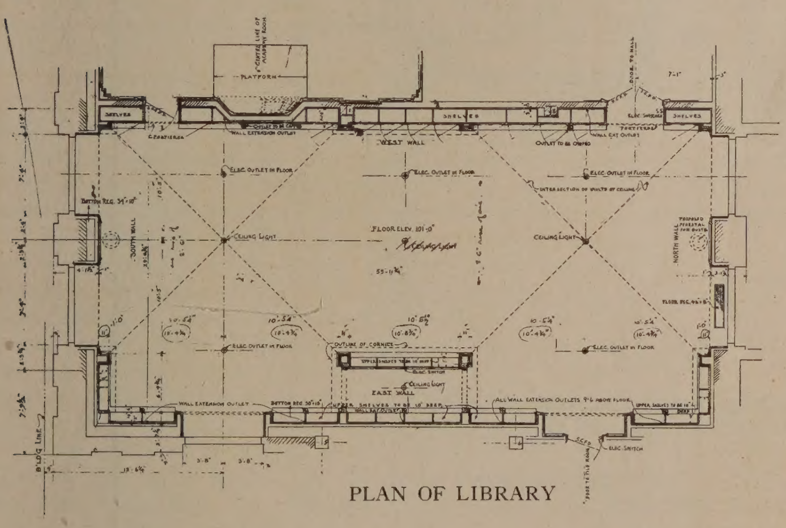
The library occupies the remainder of the façade on 155th Street, amounting to about 30 feet, and extends entirely through the building, giving it a length of 56 feet, and receives light both on the southern or street end, and the northern terrace end. It is vaulted and fitted with bookshelves and a wooden wainscoting, to the height of 9 feet.

The vaulted staircase continues from this floor to the second floor, which is, as above noted, approached directly from the Broadway terrace, and is entirely given up to the exhibition room, with the adjoining anteroom.

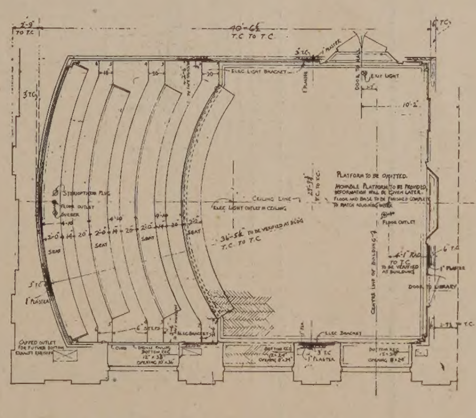
The exhibition room is 45 feet wide and extends the entire length of the 155th Street façade. The walls are left perfectly plain, for use as a background for exhibits of various kinds, and besides the three windows looking south, the room is lighted from above in the vaulted ceiling.

A minor staircase leads from this story to a mezzanine, where are located the kitchen and various storerooms and lavatories.

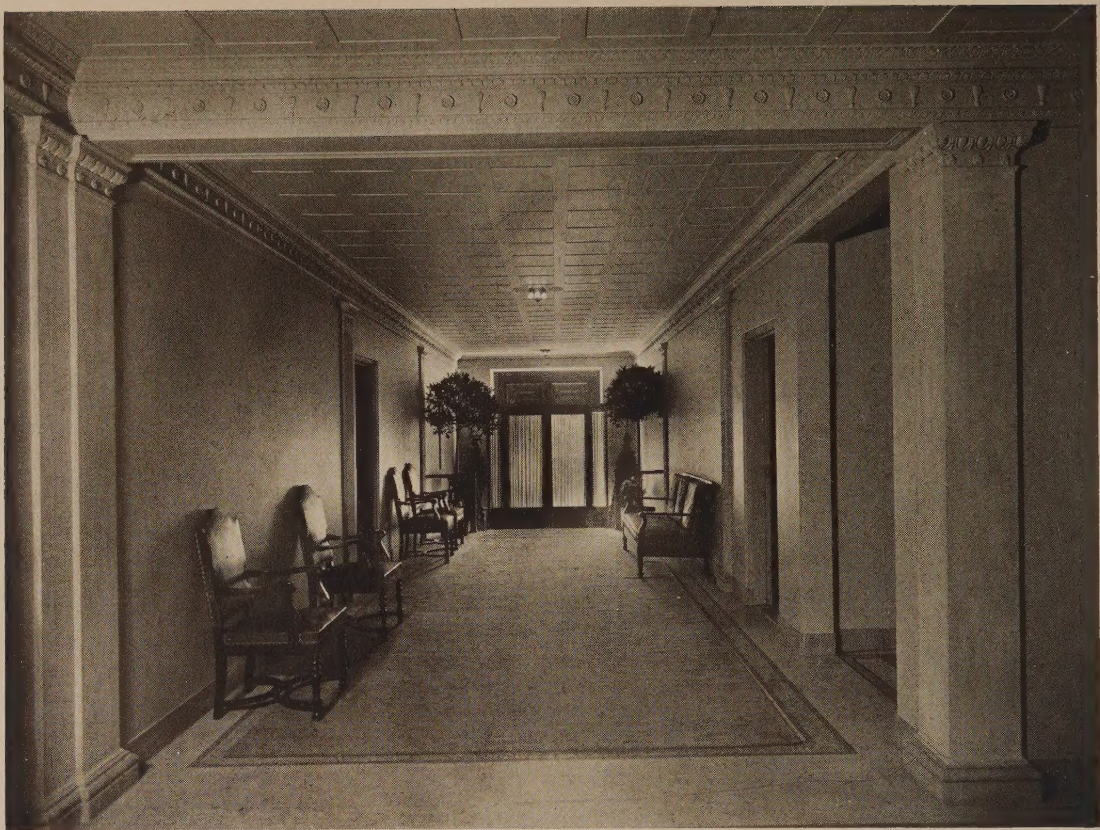
A dumbwaiter connects the kitchen with the exhibition room, when the latter is used for receptions or dinners.



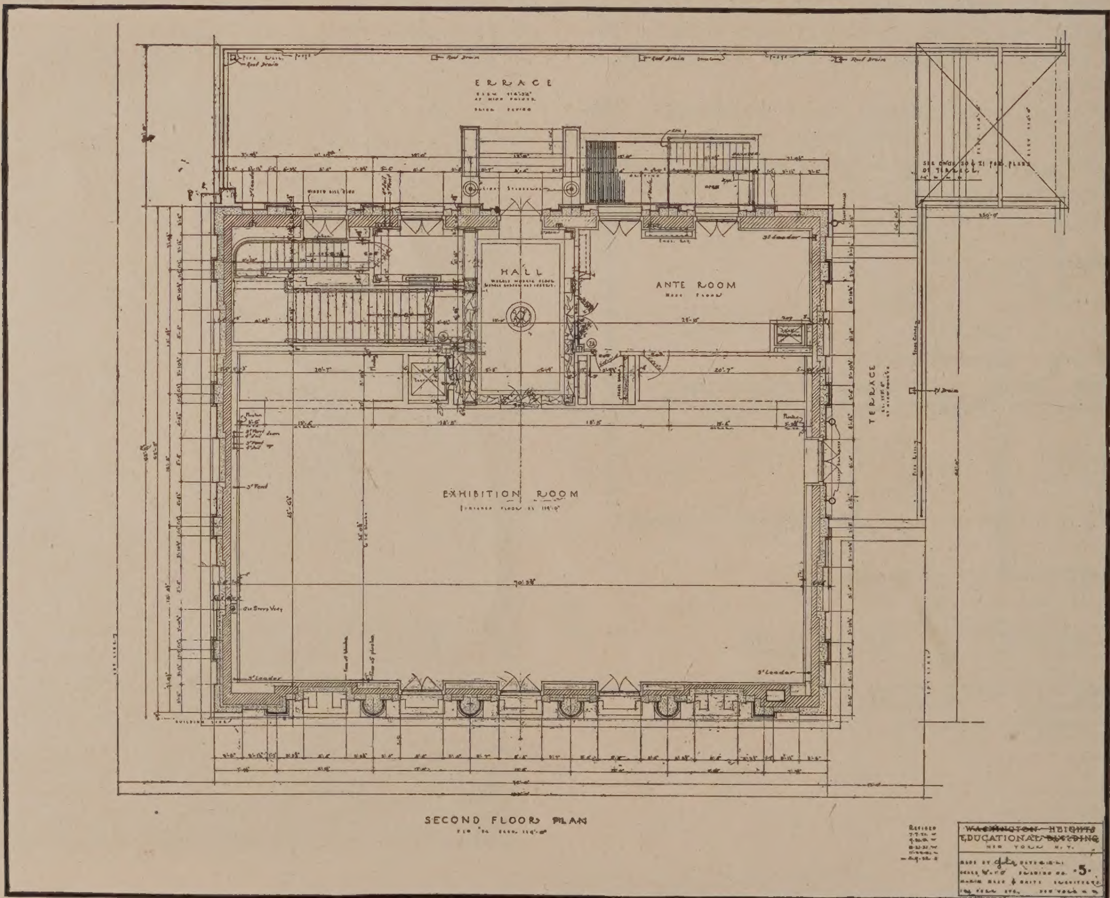
PLAN OF LIBRARY



FLOOR PLAN OF ACADEMY ROOM



ENTRANCE–HALL ON 155TH STREET.



BUILDING FOR THE AMERICAN ACADEMY OF ARTS AND LETTERS, WASHINGTON HEIGHTS, NEW YORK CITY.

McKim, Mead & White, Architects.

Editorial and Other Comment

The American Academy of Arts and Letters

THE new building for the Academy, designed by McKim, Mead & White, is a notable addition to one of the most remarkable groups of buildings in the United States. On Broadway, between 155th and 156th Streets, and extending down toward the Hudson River, there are, besides this new building for the Academy, the famous Hispanic Museum with its priceless treasures, the Museum of the American Indian, the Geographical Society, the Numismatic Society, and, on the edge of the hill, the beautiful little Spanish Church, that is one of the architectural gems of the city.

This entire development is due to the munificence and interest in the arts of one man, Mr. Archer M. Huntington. He has built here a monument to himself, to the art of Spain, to the history of our country. And yet we dare say that not one visitor in a hundred who makes the journey up-town to see these buildings and the things they contain, associates Mr. Huntington's name with them and the site they occupy.

Memorial Room, American Academy of Arts and Letters.

The American Academy of Arts and Letters numbers among its members some of the most distinguished men of our country, and many of them were present when the new building was recently formally opened. Its membership includes those eminent in literature, painting, and architecture.

The opening address was made by Sir Frederic Kenyon, and he referred to the great services that writers might perform for the cause of international relations. British historians, he said, had given but superficial attention to the development of the United States, while our own school histories had too often made "a whipping block of England."

In the corner-stone of the building are the names of two persons, neither one announced. "They intend that this should be a temple dedicated to the service of truth, and, as Cervantes said, 'where truth is, there is God.' It is committed in perpetuity to the use of the American Academy, because the givers believe that the history of the fine arts in any land is the truest record of the spirit and aspiration of those who dwell in that land, the one they both love best."

The directors of the Academy announced that by a unanimous vote its gold medal for distinction in literature had been awarded to Mrs. Schuyler Van Rensselaer, for her work in history, art criticism, and poetry.

Many of our readers will recall Mrs. Van Rensselaer's contributions to the history and criticism of architecture.

A Good Sign

RECENT reports by the F. W. Dodge Co. indicate an era of residential building far beyond the ordinary, with the prospect of a constantly increasing development in this direction.

This means that work for the architects is being distributed all over the country and that there should be enough to keep them busy for months to come.

The big offices that are concerned with the designing of large commercial and industrial structures and city apartment-houses have been very busy for some time, but the big things are not for all, and residential work widely distributed is, after all, the foundation upon which the prosperity of the profession at large depends.

People who have waited for prices of materials to go down or for any reduction in the cost of labor have realized that there is not the least hope of any change for the better, and have made up their minds to build now.

ARCHITECTURE will publish during coming months a number of recently designed residences of more than ordinary interest and in localities that have not been as fully represented as they deserve.

We are concerned with good architecture from every part of the country. Our interests are national, not local; we might almost say international, to judge from the number of readers we have both in Europe and South America.

We are gratified to see that there is such a manifest building boom through the South and Southwest and in the Northwest, but the chief cause for rejoicing is that a feeling of confidence in the future seems to prevail everywhere.

The Convention of the American Institute of Architects

THE Convention of the Institute will be held in Washington, D. C., May 16–18. At this meeting the gold medal of the Institute will be presented to Mr. Henry Bacon for his design of the noble and inspiring Lincoln Memorial.

The award will be made within the walls of the memorial, and the occasion promises to be one of great dignity and ceremony. It is planned, we understand, to have a procession composed of the officers and members of the chapters present, and others.

Fifteen Million People Live in Zoned Cities

MORE than 15,000,000 people live in zoned cities, towns, and villages, according to information made public to-day by the Division of Building and Housing of the Department of Commerce. Computations show that the homes of 27 per cent of the total urban population of the country are located in zoned municipalities, and it follows that most of these homes are protected from intrusion of garages, stores, warehouses or manufacturing plants.

Zoning regulations provide, by a neighborly kind of agreement, that a city or town shall be divided into districts in which the uses for which structures may be built, their maximum height, and the area of the lot which they may cover, are established. In line with the zoning plan, certain districts are set aside for residences, for apartment-houses, for office-buildings, and for manufacturing. Ample provision is made for normal growth of business and industrial districts, but the builder of a garage or factory is not allowed to erect it within a residential neighborhood regardless of the annoyance and money losses inflicted on surrounding home owners.

The department's investigation shows that in 1922 zoning spread especially rapidly in smaller places. Fourteen towns with five to ten thousand inhabitants were zoned during the year, bringing the total zoned towns in this class to twenty-three. Twelve places with 5,000 inhabitants or less were added to the list in 1922, bringing the total in that class to seventeen. The percentage of large cities which have already zoned remains much greater, of course, and of the fifty largest cities in the country twenty-two have zoning ordinances in effect.

In the entire country, 109 cities, towns, and villages were zoned on January 1, 1923, as compared with 55 just one year before.

New York, the largest city in the country, has been zoned since 1916, and in contrast, the smallest zoned community had only 131 inhabitants according to the 1920 census. Eighty-one per cent of the urban population of New York State lives in zoned municipalities. California ranks second among the States with 71 per cent of her urban population zoned; Minnesota, third, with 58 per cent; New Jersey, fourth, with 57 per cent; and Utah, fifth, with 55 per cent. The entire District of Columbia is zoned.

In number of places zoned, New Jersey leads with 31; New York is second with 17; California, third, with 14; Illinois, fourth, with 10; Ohio, fifth, with 9; and Massachusetts and Wisconsin follow with 6 each.

The Michael Friedsam Industrial Arts Development Medal

MICHAEL FRIEDSAM recently presented to Howard Greenley, president of the Architectural League, an Industrial Arts Development Medal to be competed for by artists and artisans of America and to be presented by the Architectural League to that individual who has contributed most to the development of art in industry in 1923.

The medal was presented to Mr. Greenley at a ceremony which took place in front of B. Altman & Company. Before Mr. Friedsam presented his medal, Mr. Greenley and a committee of architects waited upon him and asked him to accept the chairmanship of a committee to further industrial arts in America.

In giving this headship of the committee to Mr. Friedsam, Mr. Greenley stated that it was done in recognition of Mr. Friedsam's continuing part of the Silk Show by displaying at Altman's exhibits secured through the courtesy of Charles Cheney.

Mr. Friedsam, in presenting the medal to Mr. Greenley, stated that he hoped it would be an incentive to a further linking together of art and industry. The medal will be known as the Michael Friedsam Medal.

The committee of award of the Architectural League consists of Howard Greenley, president; James Monroe Hewlett, president of the Mural Painters, Doctor John H. Finley, Charles Cheney, Professor C. H. Richards, and Sidney Blumenthal.

Herbert E. Hewitt on the Duties of the Architect

WE have a duty as architects and as men toward ourselves and toward our fellow architects as well as toward our public. An analysis will show that these duties are in no way in conflict. In every transaction in an architect's office there are three and sometimes four interests to be considered—the public as represented by the client, the contractor, the fellow architect, and the architect himself. It is the first duty of the architect to so regulate his dealings as to command the respect of all the parties. It goes without saying that if he has the respect of the three parties his own self-respect will not be in danger. It is not my purpose to enter into a discussion of the relationship of the various parties, but merely to point out some standards of conduct by means of which the status of the architect may be improved.

It may be stated without fear of contradiction that every time an architect indulges in conduct that hurts himself, he injures the entire profession; and, contrary, every time he indulges in conduct that injures a fellow-architect, he hurts himself. I think one of our commonest faults is a lack of belief in ourselves, and a consequent failure to impress our public. The architect who is willing promiscuously to make free sketches for every pipe-dream that comes along fails to have the proper regard for the value of his own services, and hurts the profession by thus belittling the value of architectural service. The architect who is slack or unbusinesslike in his dealings with clients, even when the client is financially benefited, hurts himself and hurts the profession. The "Simple Simon" architect, who allows his client to get the best of him, injures himself, not only by the amount of the fee he loses, but lessens his client's respect for him and for the entire profession. The great future lies before us, and we can already see the dawning of a new interest in the development of art and beauty. The possibilities and the responsibilities of this development lie with us, the architects of this territory, more than with any other group of citizens. The work of the painter and the sculptor is seen by the few. The best books are read by the cultured minority. But the work of the architect is set out where all who have eyes to see may be influenced by the magic subconscious, slow-working, but none the less potent, spell of beauty. Our greatest duty to our public is, first, a deep-seated realization of our responsibilities; and, second, a determination to do all that circumstances and our ability will allow toward the cultural development of our little part of the world.

From "The Bulletin of the Illinois Society of Architects."

AMERICAN ACADEMY OF ARTS AND LETTERS, WASHINGTON HEIGHTS, NEW YORK CITY. McKim, Mead & White, Architects.

EXHIBITION-ROOM, AMERICAN ACADEMY OF ARTS AND LETTERS, WASHINGTON HEIGHTS, NEW YORK CITY. McKim, Mead & White, Architects.

ACADEMY ROOM, AMERICAN ACADEMY OF ARTS AND LETTERS, WASHINGTON HEIGHTS, NEW YORK CITY.

McKim, Mead & White, Architects.

DETAIL, UPPER HALL.

DETAIL, UPPER HALL.

AMERICAN ACADEMY OF ARTS AND LETTERS, WASHINGTON HEIGHTS, NEW YORK CITY.

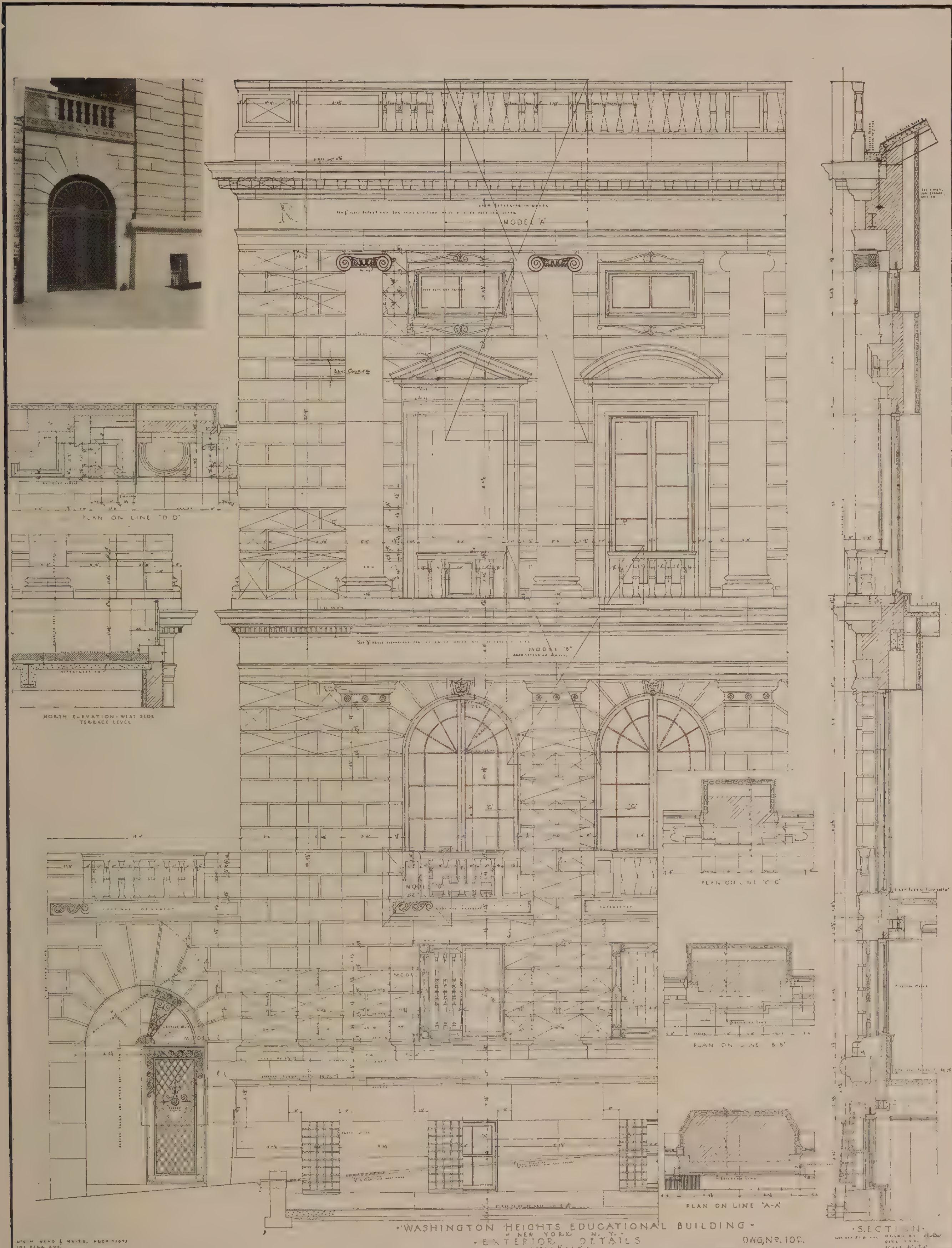
McKim, Mead & White, Architects.

ENTRANCE, 155th STREET.

LIBRARY.

AMERICAN ACADEMY OF ARTS AND LETTERS, WASHINGTON HEIGHTS, NEW YORK CITY.

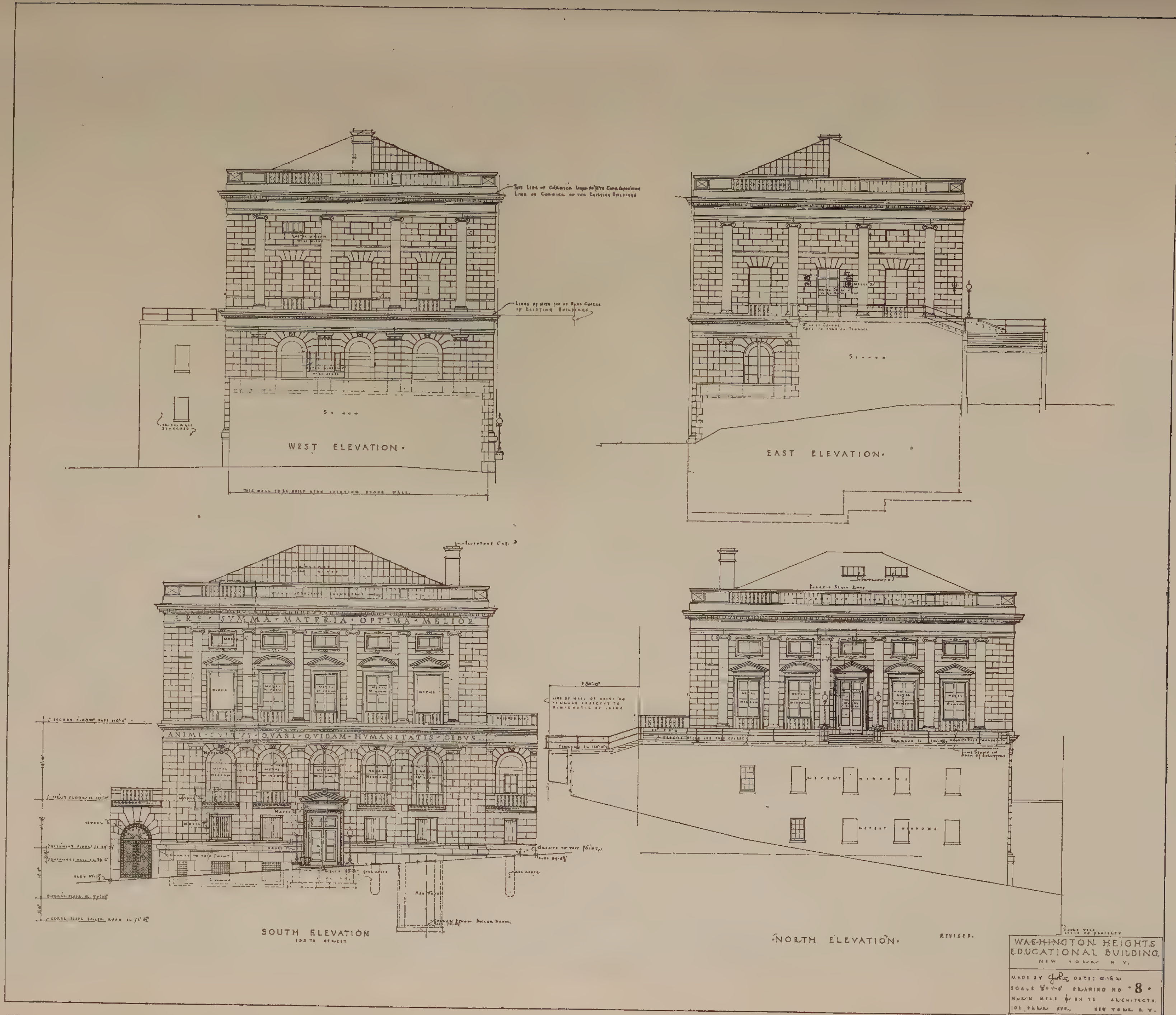
McKim, Mead & White, Architects.



DETAIL SHEET.

McKim, Mead & White, Architects.

AMERICAN ACADEMY OF ARTS AND LETTERS, WASHINGTON HEIGHTS, NEW YORK CITY.



ELEVATIONS, AMERICAN ACADEMY OF ARTS AND LETTERS, WASHINGTON HEIGHTS, NEW YORK CITY.

McKim, Mead & White, Architects.

JOHNSTON COUNTY COURT-HOUSE, SMITHFIELD, N. C.

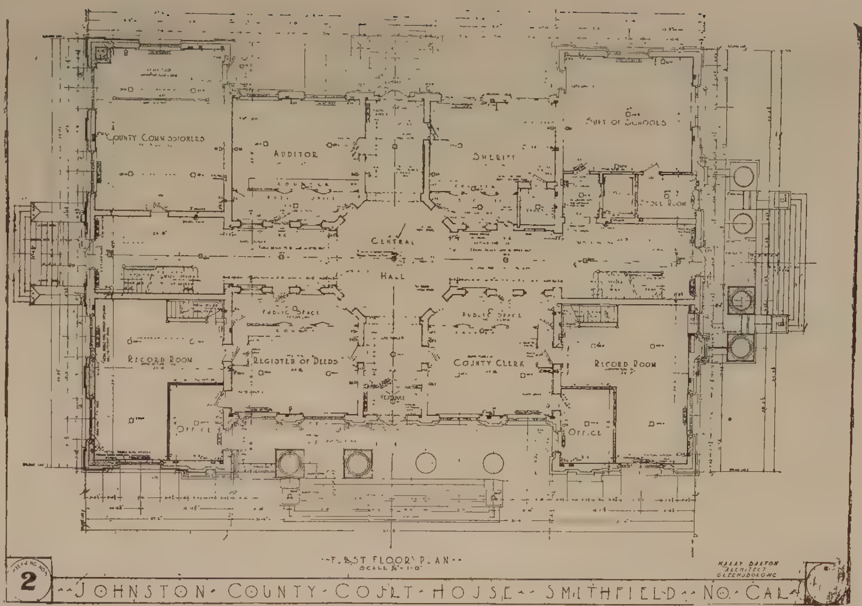
Harry Barton, Architect.

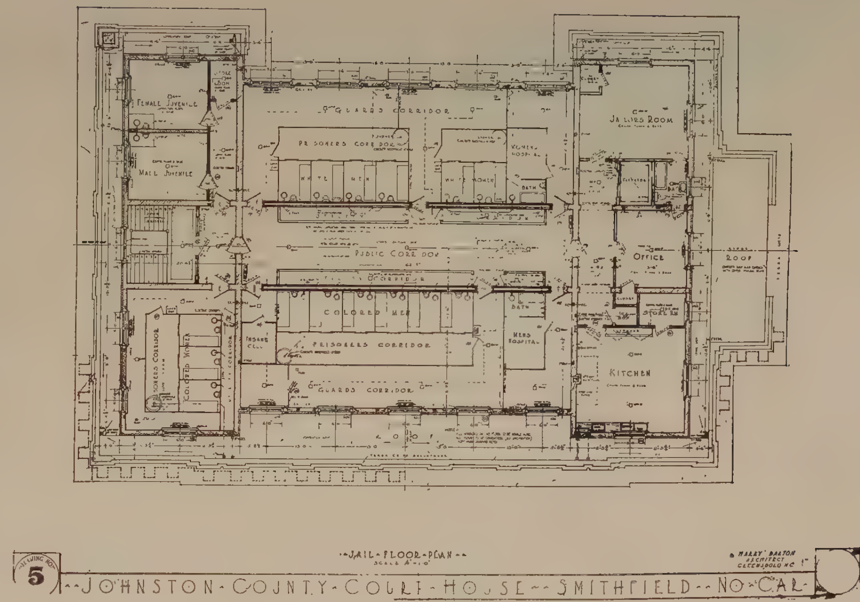
CENTRAL HALL.

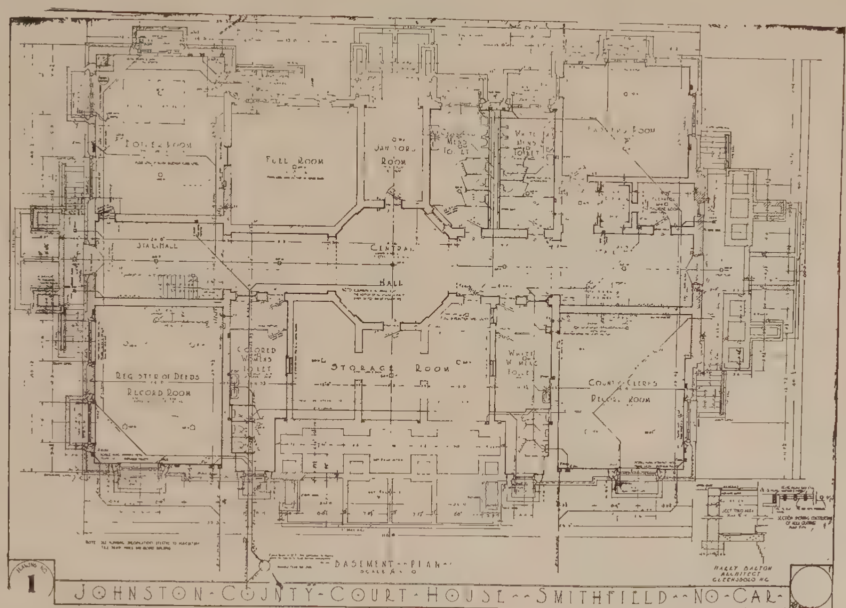
COURT-ROOM.

Harry Barton, Architect.

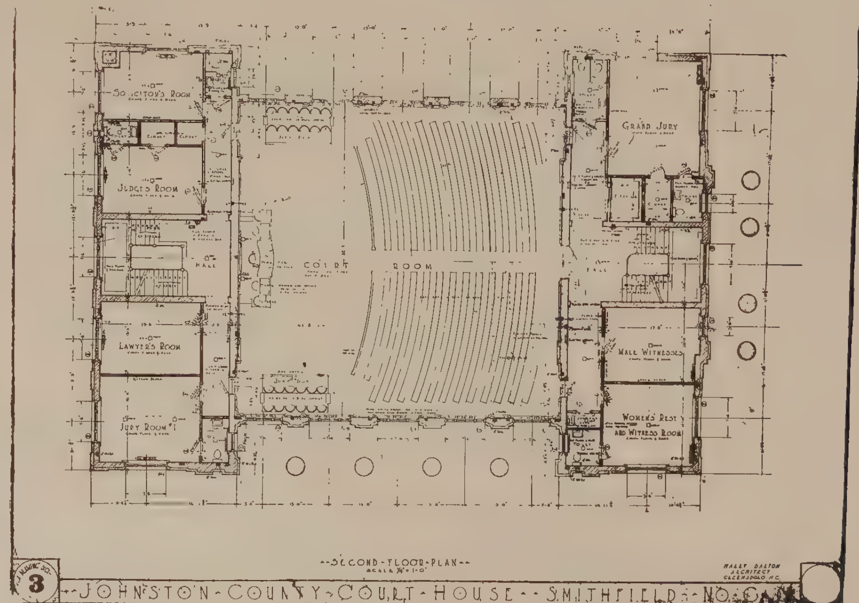
JOHNSTON COUNTY COURT-HOUSE, SMITHFIELD, N. C.



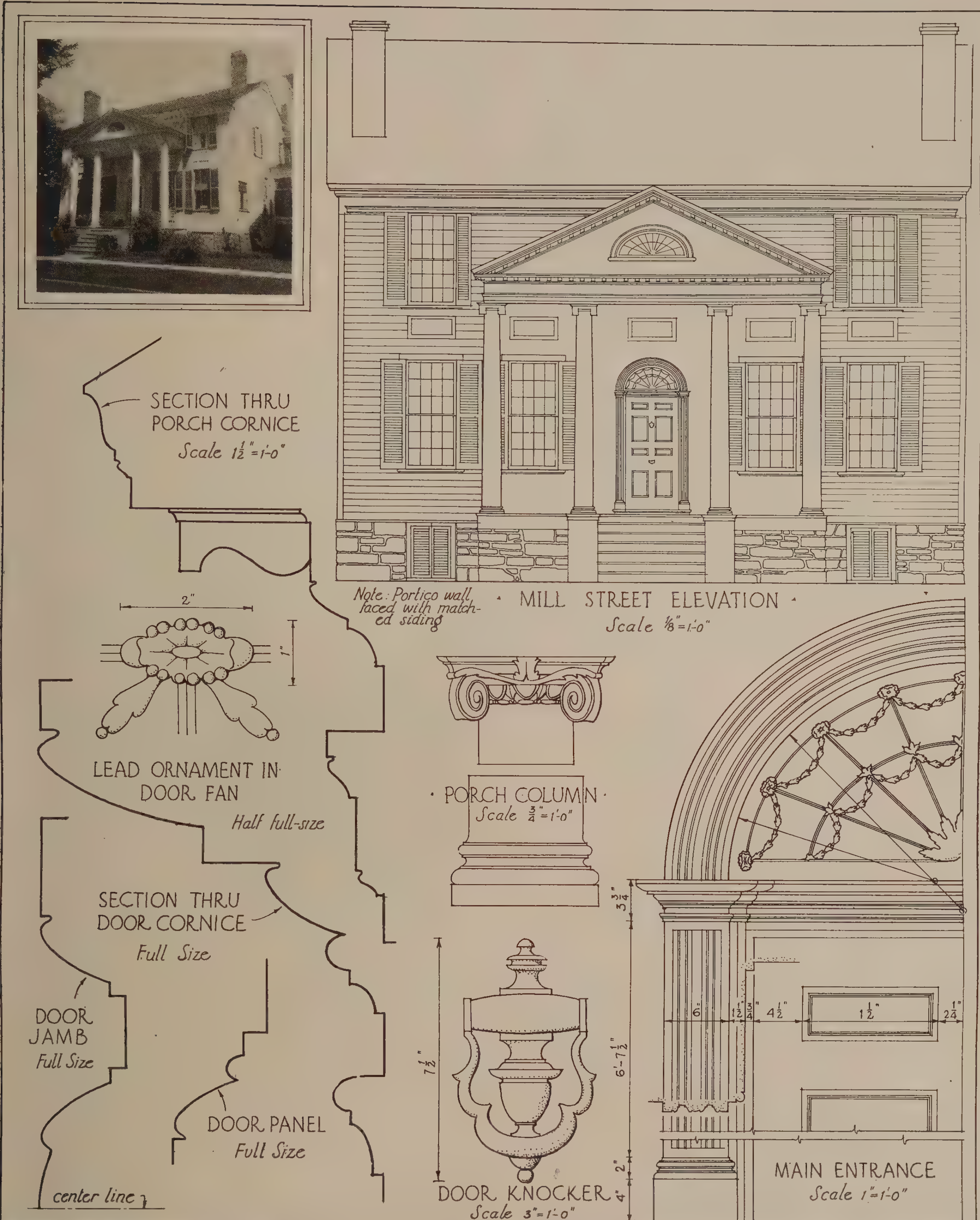




PLANS, JOHNSTON COUNTY COURT-HOUSE, SMITHFIELD, N. C.



Harry Barton, Architect,



EARLY ARCHITECTURE OF WESTERN NEW YORK

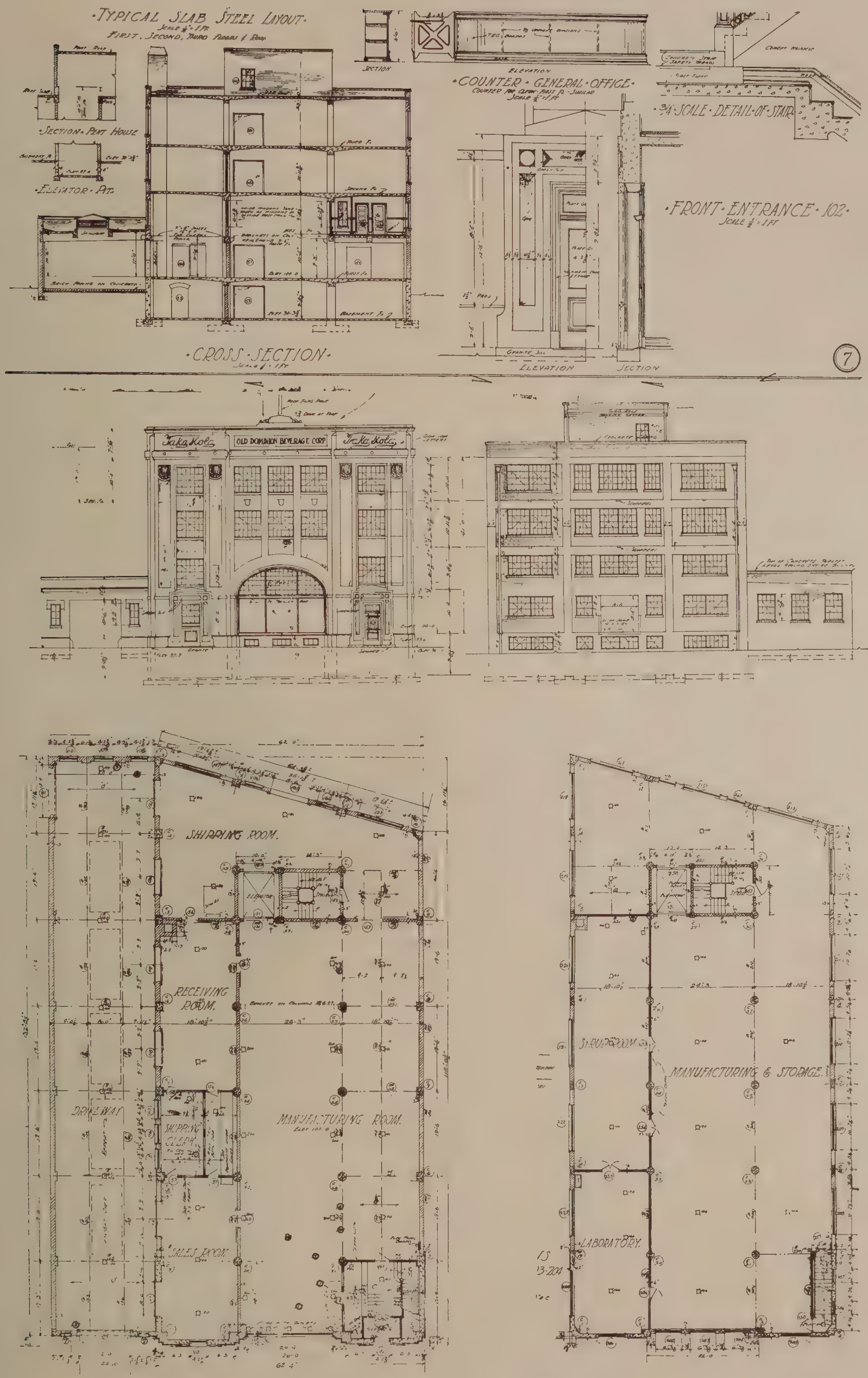
THE JUDD HOUSE

BUILT ABOUT 1827 AT ITHACA N.Y.

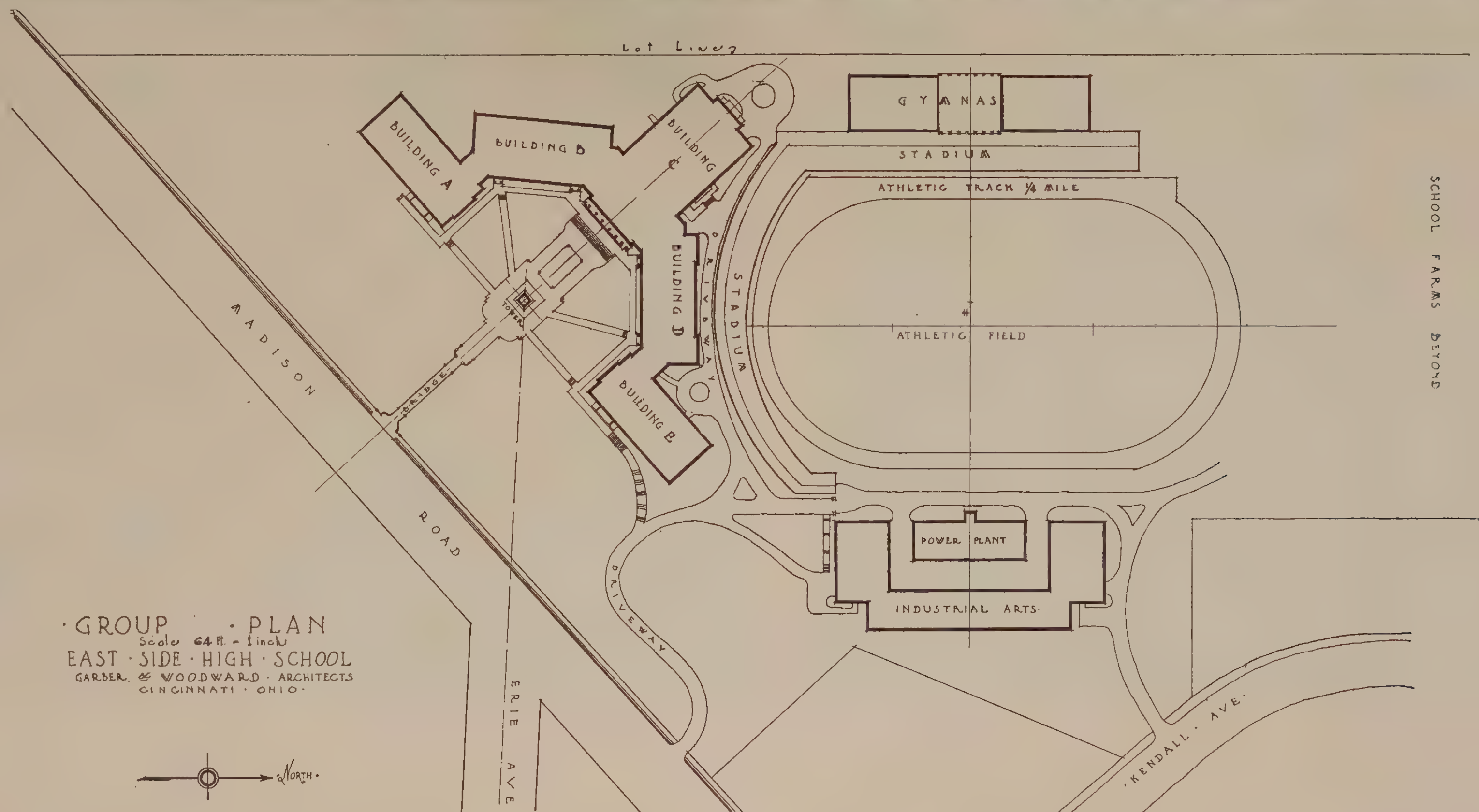
MEASURED & DRAWN BY CHAS. M. STOTZ

BOTTLING PLANT, OLD DOMINION BEVERAGE CORPORATION, RICHMOND, VA.

Carneal & Johnston, Architects.

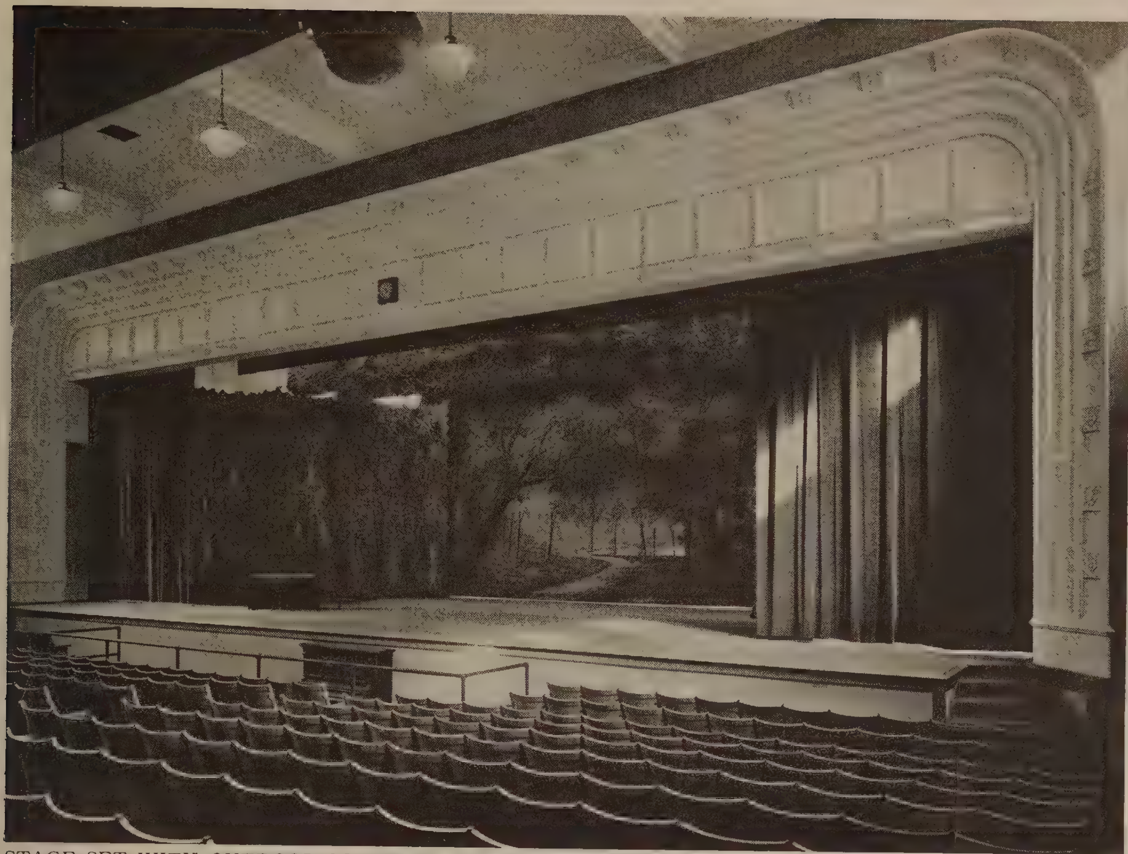


BOTTLING PLANT, OLD DOMINION BEVERAGE CORPORATION, RICHMOND, VA. Carneal & Johnston, Architects.

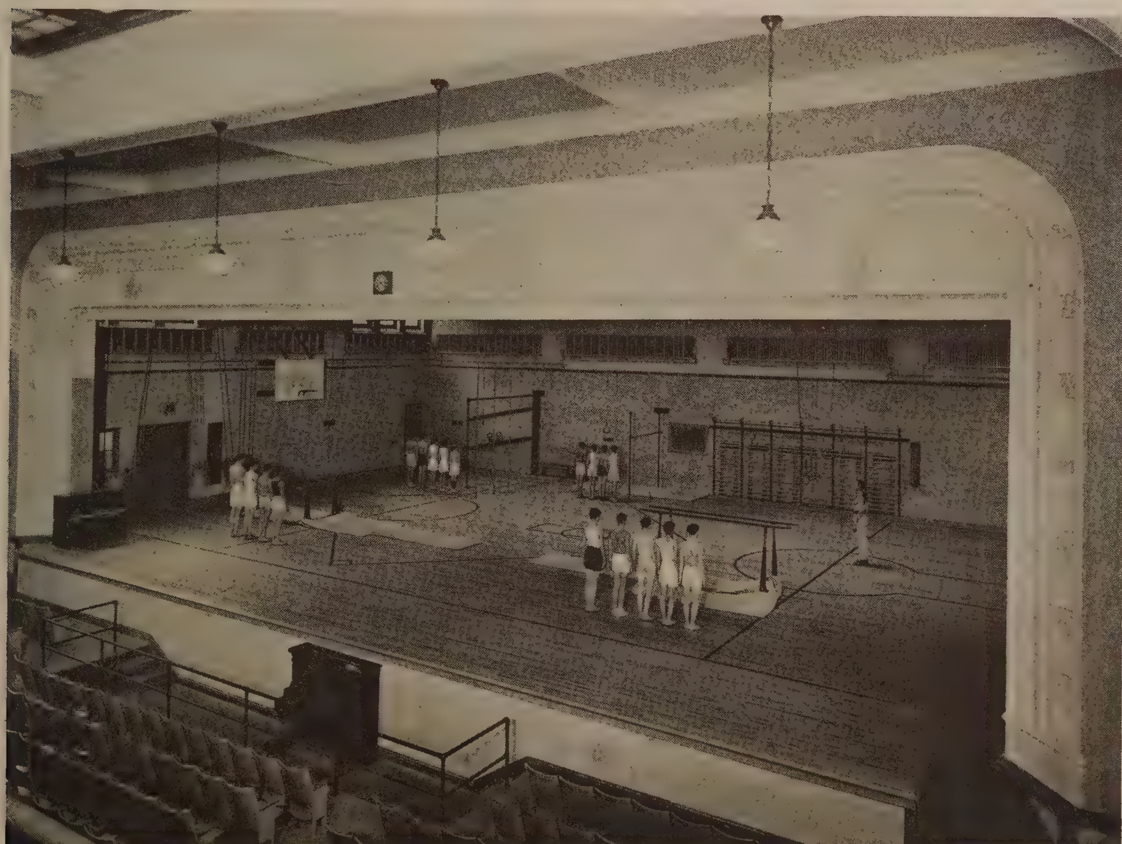


ACADEMIC GROUP, EAST SIDE HIGH SCHOOL, CINCINNATI, OHIO.

Garber & Woodward, Architects.



STAGE SET WITH OUTDOOR SCENE FOR PLAY.

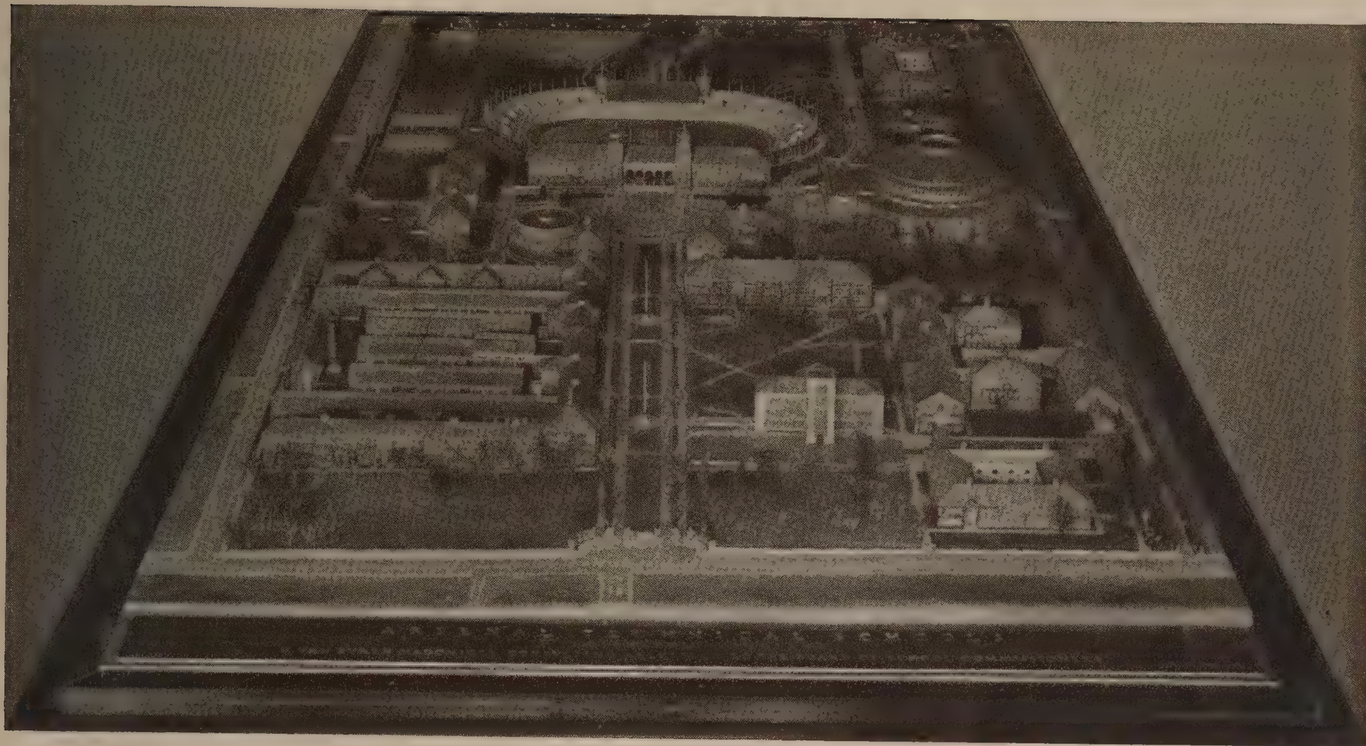


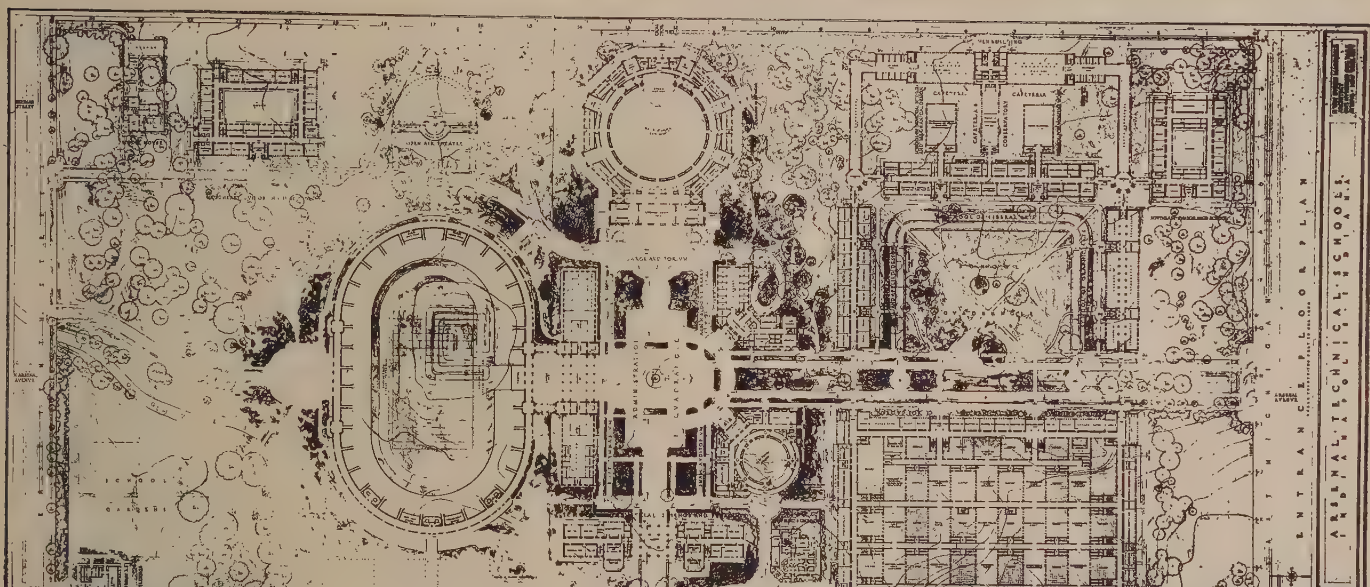
STAGE SET FOR GYM CLASS.

Jos. C. Llewellyn Co., Architects.

DUNDEE COMMUNITY HIGH SCHOOL, DUNDEE, ILL.

The change from one to the other is very easily made. At the time of taking these photos, the change from the bare gymnasium floor to the stage set as an outdoor scene occupied not to exceed twenty minutes; and likewise in changing from this scene back to the stage for gymnasium work. The arrangement is economical and has been used in a number of buildings by various architects.





THE ARSENAL TECHNICAL SCHOOLS, INDIANAPOLIS, IND. H. Van Buren Magonigle, F. A. I. A., Architect.

(From the architect's report)

The people of Indianapolis are fortunate in the possession of a site for the Arsenal Technical Schools of unusual advantages, qualities, and beauty. It is only a mile from the very heart of the city, and equally accessible therefore from every part. As the former site of the United States Arsenal it has historical associations. It has many natural beauties—slightly rolling ground with groves of fine trees interspersed with more open spaces. A stream, Pogue's Run, flows through the northwesterly corner and further diversifies and gives interest to the grounds.

The various buildings and groups of buildings are: School of Liberal Arts; School of Industrial Science and Mechanical Design; School for Women's Work; Schools of Commerce and of Applied Design; School of Graphic Arts; Group for Mechanical and Building Trades, Including Power-House (Shop Group); School of Industrial Science and Pedagogy; Cafeterias for Students, Faculty, Employees, and for Night School; Two Junior or Pre-Vocational High Schools; Administration and Library Building; An Auditorium with a Seating Capacity of 1,500 with Meeting-Rooms; A Gymnasium for Boys and One for Girls; A Stadium and Athletic Field; An Auditorium with a Seating Capacity of about 9,000; An Open-Air Theatre; A Model House for Domestic Science Work; A Residence and Office for a Superintendent of Buildings and Grounds; Farm Building and Greenhouse in Connection with School Gardens.

These fall naturally into two main divisions: (1) School-buildings proper and (2) those devoted to general or special purposes, and especially for the assembly of large numbers of persons.

In all cases the buildings have been so designed that a portion of each could be erected as required.

Cossitt Avenue School, La Grange, Ill. Childs & Smith, Architects.

School Architecture

By Childs & Smith, Architects

ONE returned from the recent convention of the National Education Association at Cleveland with a decidedly optimistic impression. The smug satisfaction of educators has been replaced by a searching review of old methods and a careful study in the effort to arouse the school administrations to the needs and problems of the present. The decision of the convention to work for a place in the President's cabinet and calling of an international convention of educational men points the way to a little less of political domination, and should prove momentous in scope and influence if carried out under proper leadership.

Architects have discovered that the school is a fertile field of endeavor, and entitled to serious thought and study, even more than most buildings. The strangle-hold of the old plan with interior courts is giving way in favor of the open type now generally followed in the business world.

The enriched curriculum of the modern school with its community and civic uses, day and night, has developed an entirely new building programme, which the younger architects are quick to seize and express in a variety of ways. Many high and technical schools are developing along the lines of a university campus, as evidenced in the Arsenal group at Indianapolis and the Roosevelt group at Detroit. As clearly stated by one superintendent, there is no reason why our modern buildings should not last two hundred years, and that they should be so planned as to accommodate the rearrangement of space in different units to meet the ever-changing demands of the educational programme. Poorly lighted basement and attic space, ill suited for anything but junk space, to be continually put in order, is a thing of the past.

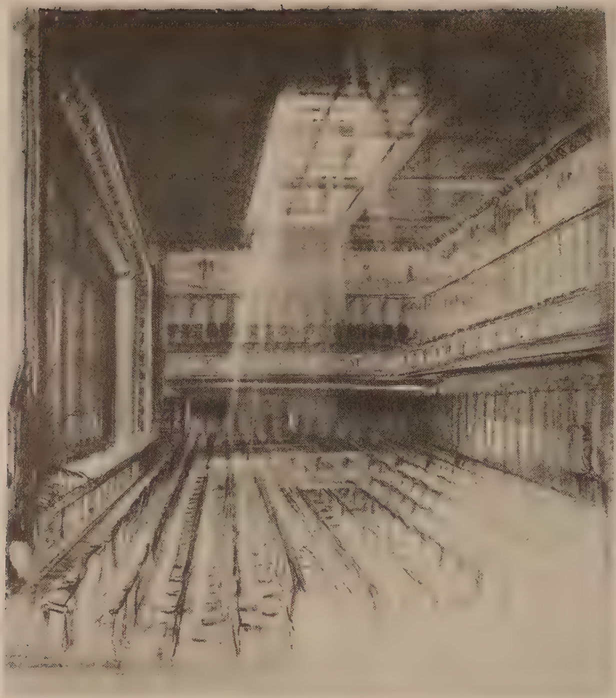
Strict attention to window area and arrangement of same, together with the use of materials best suited to school needs in point of initial cost and elimination of future maintenance as far as possible, is plainly evident in the better plans. The broadening and finding courses in twenty different vocational subjects so interestingly portrayed by one Western superintendent point to the increasing need of shop space.

The growing insistence on physical training for the health and happiness of every pupil and the recreational and leisure-time programmes have reduced the actual classroom space to 20 per cent of the total school area. With all these opportunity classes we shall have fewer round pegs in square holes and fewer square pegs in round holes, and after visiting a school of this nature one is reassured that the oncoming generation will not be afraid to work with their hands, and that certain superficial white-collared standards of society are on the wane.

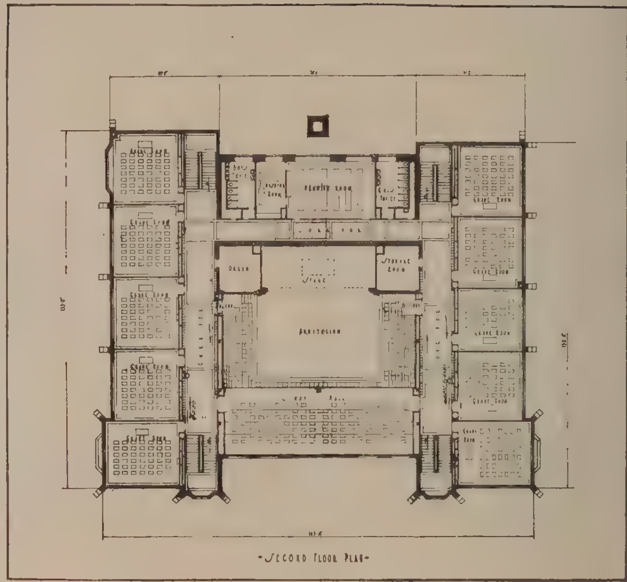
The value of teaching in such a way as to insure the interest and active individual inquiry and search on the part of every pupil has at last been realized, as well as the coordination of every academic subject in its relation to concrete things of daily life.

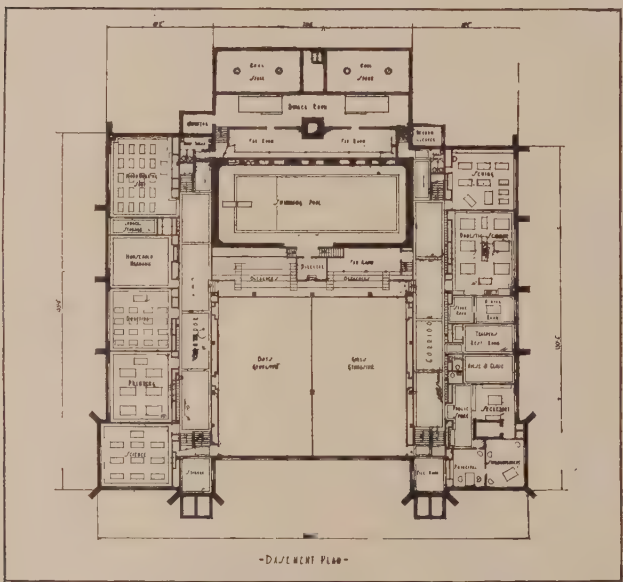
By subdivision of pupils into three groups, the normal, special, and gifted, it has been found that the greatest benefit accrued to the 84 per cent normal class, and that specially suited teachers enabled the slower-going 10 per cent group to proceed with more interest and less desire to drop out of school. The 6 per cent gifted class being all the same caliber have no chance to loaf on the job, as they are given a stiffer and more difficult programme in the same space of time.

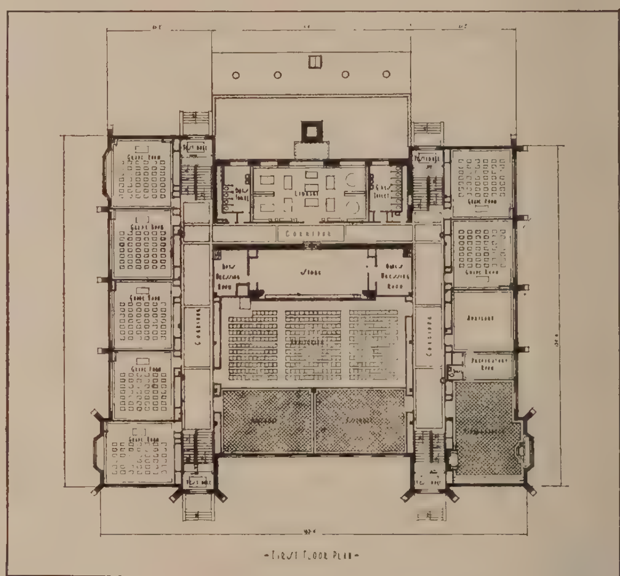
Such a complex programme as the above cannot fail to attract the interest of the best architectural talent in the country, and will no doubt produce immediate results in buildings of interesting architectural character, in place of the boxlike factory structures of the last decade.



Auditorium, Cossitt Avenue School, La Grange, Ill.



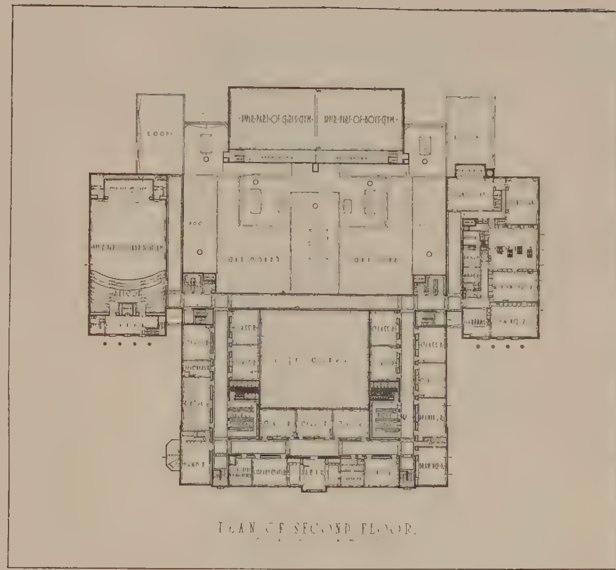


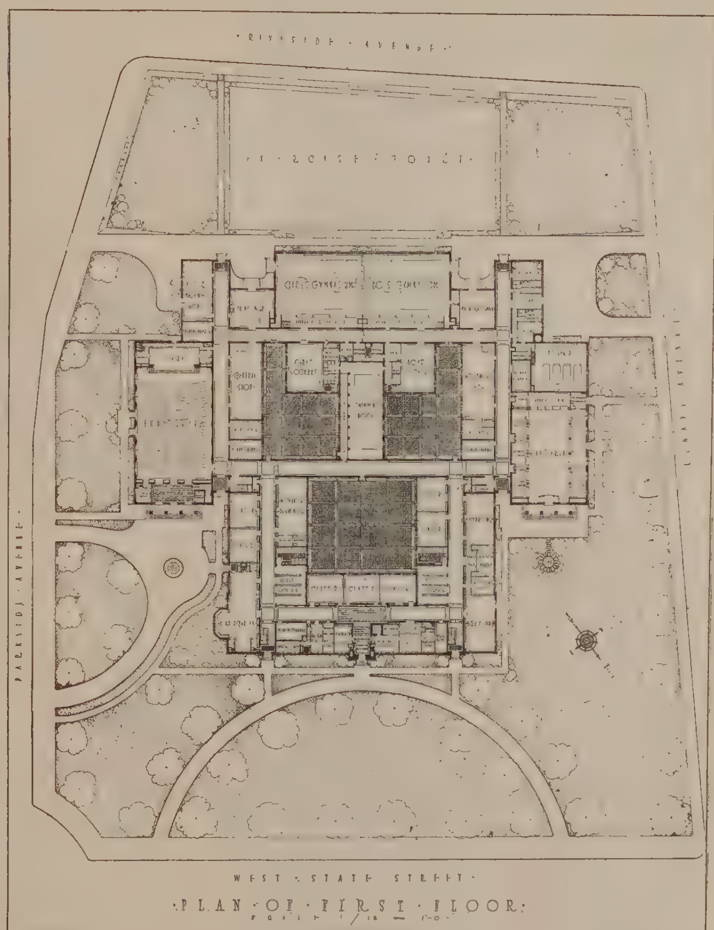


Cossitt Avenue School, La Grange, Ill.

Childs & Smith, Architects.

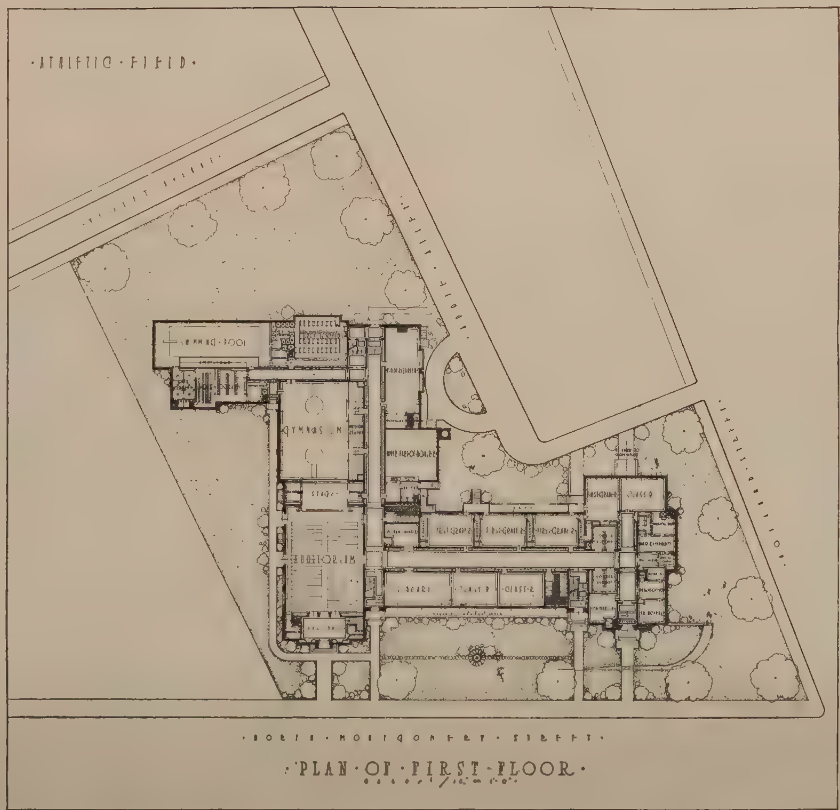
The entire building exhibit at Cleveland was made possible through the efforts of Superintendent Condon, of Cincinnati, and his very able assistant, Mr. Vogel. The keen appreciation of these two men for beauty has had much to do with the front rank their city is taking in school buildings. Their East Side high school is unique in this country, and has been specially complimented by exhibition in the Paris Salon. The school developments of this city and Detroit will be closely watched by those interested in buildings and programmes within the next few years.





JUNIOR HIGH SCHOOL NO. 3, TRENTON, N. J.

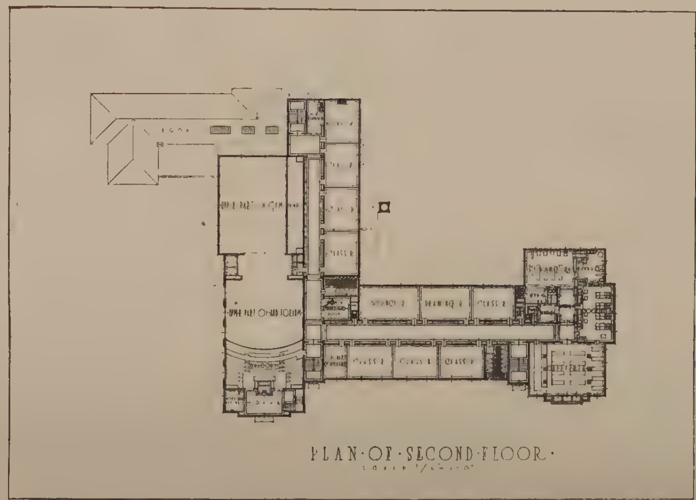
Ernest Sibley, Architect.
J. Osborne Hunt, Associate Architect.



ELEMENTARY AND INTERMEDIATE SCHOOL,
TRENTON, N. J.

Ernest Sibley, Architect.

Wm. W. Slack & Son, Associate Architects.



Charleston, S. C., Meeting of A. I. A.

INTENDED originally as a joint session of the chapters of North and South Carolina, the convention grew into a conference of the architects of the Southeast with the national executive committee of the Institute participating. Representatives of the North Carolina Association, Georgia and South Georgia Chapters, and Florida Chapter were present, and the result was a most gratifying mingling of the architects of a large section of the country, where, on the other hand, there is a sufficient community of interest to give the meeting a practical as well as what might be called an academic value. One result has been the formation of a joint committee to study the plan of a regional organization, by which one of the two meetings which are held each year would regularly be a joint session. Most of the chapters in this section are relatively small. The larger meetings are a distinct inspiration that will react favorably on chapter affairs if they come to be regular annual features.

The convention opened with a joint session on the morning of March 29. Mr. W. C. Miller, vice-president of the Carolina Art Association, gave welcome in the name of the allied arts, and in words that were scholarly in their appreciation and delightful in their flavoring of humor. Mr. Faville, president of the Institute, responded for the architects, after which the executive committee retired for its business session and the North and South Carolina Chapters held their joint meeting. The discussion was chiefly on the topic of the raising of professional standards, and was spirited and general.

The second morning was given to separate chapter meetings for routine business. South Carolina Chapter elected the following officers: President, J. D. Newcomer, Charleston; Vice-President, H. D. Harrall, Bennetsville; Secretary and Treasurer, Albert Simons, Charleston; Executive Committee, Nat. G. Walker, Rock Hill, and H. Olin Jones, Greenville. The programme for the afternoon was an auto trip through the "back country," stopping at St. Andrew's Church (1706), the old plantation home of Drayton Hall, and finishing at Magnolia Gardens. The gardens were at the height of their glory, in an almost unbelievable riot of color against the background of Spanish moss, or reflected in the dark water of the pools among the cypress-trees.

The third morning was a joint session led by the members of the national executive committee. Mr. Kohn told of the work of the joint committee in New York, Mr. Parker described similar activities in Boston, and Mr. Faville in San Francisco. Mr. Parker also talked on the subject of contracts and the Institute documents, and Mr. Dunning on competitions. Their talks all provoked lively discussion, and the meeting was a most spirited closing feature. South Carolina had voted on the previous day to extend an invitation to the Institute to hold the next national convention, away from Washington, in Charleston, and at this last meeting the neighboring States voted their indorsement of the invitation.

Book Reviews

ENGLISH ARCHITECTURE AT A GLANCE. A SIMPLE REVIEW IN PICTURES OF THE CHIEF PERIODS OF ENGLISH ARCHITECTURE. With an Introduction by FREDERICK CHATTERTON, F.R.I.B.A. The Architectural Press, 27 Tothill Street, London.

The title hardly needs explanation. It is a graphic elementary handbook showing in a series of drawings essential details of English architectural growth.

The examples illustrated include the Norman style, Early English, Gothic, the Decorated style, the Perpendicular style, the Tudor Period, and others, down to present-day examples.

THE BUNGALOW BOOK. By CHARLES E. WHITE, JR. With drawings by the author. The Macmillan Co., New York.

This is not so much a book of bungalow designs, rather more a guide to methods of construction and to the proper ways of maintaining and living in a bungalow.

The chapters include "Planning the Bungalow," "The Fireproof Bungalow," "Methods of Construction," "Ideas for Comfort," "Warming Systems," "Lighting," "Kitchen and Laundry," "Painting," "Gardening," "Garage," etc.

It tells you the kind of bungalow that is desirable, and tells you how to live in it after you have built or bought it.

THE BOOK OF BUILDING AND INTERIOR DECORATION. Edited by REGINALD T. TOWNSEND, Editor of *Country Life*, Doubleday Page & Co., New York.

Mr. Townsend has collected in this attractive volume pages of text and illustrations from *Country Life*. It contains a number of examples of admirable residences designed by prominent American architects, and shows how some of them are decorated and furnished.

It is a book about houses and the things a well-equipped house should contain, including such matters as pictures, furniture, textiles, etc. The illustrations are numerous and handsomely printed.

ARCHITECTURAL COMPOSITION. By D. VARON, architect, D. P. and G. F., former Professor of Architecture at Syracuse University and the University of Illinois. With 40 plates of illustrations by the author. William Helbrun, Inc., New York.

Professor Varon's former book, "Indication in Architectural Design," has long been a standard and valued work. In his new volume he again accents with fine enthusiasm the need in these days of ever keeping in mind that architecture is a fine art. We need to cultivate and immerse our minds in the spiritual as well as the practical, for no good achievement in art can be accomplished without the combination. In various chapters he discusses the essential elements of good design, and illustrates his books with a series of progressive sketches or drawings that bring out clearly the things he wishes to teach.

He makes the student understand the expressive value of architectural design, the character, personal or national, that it embodies and makes manifest.

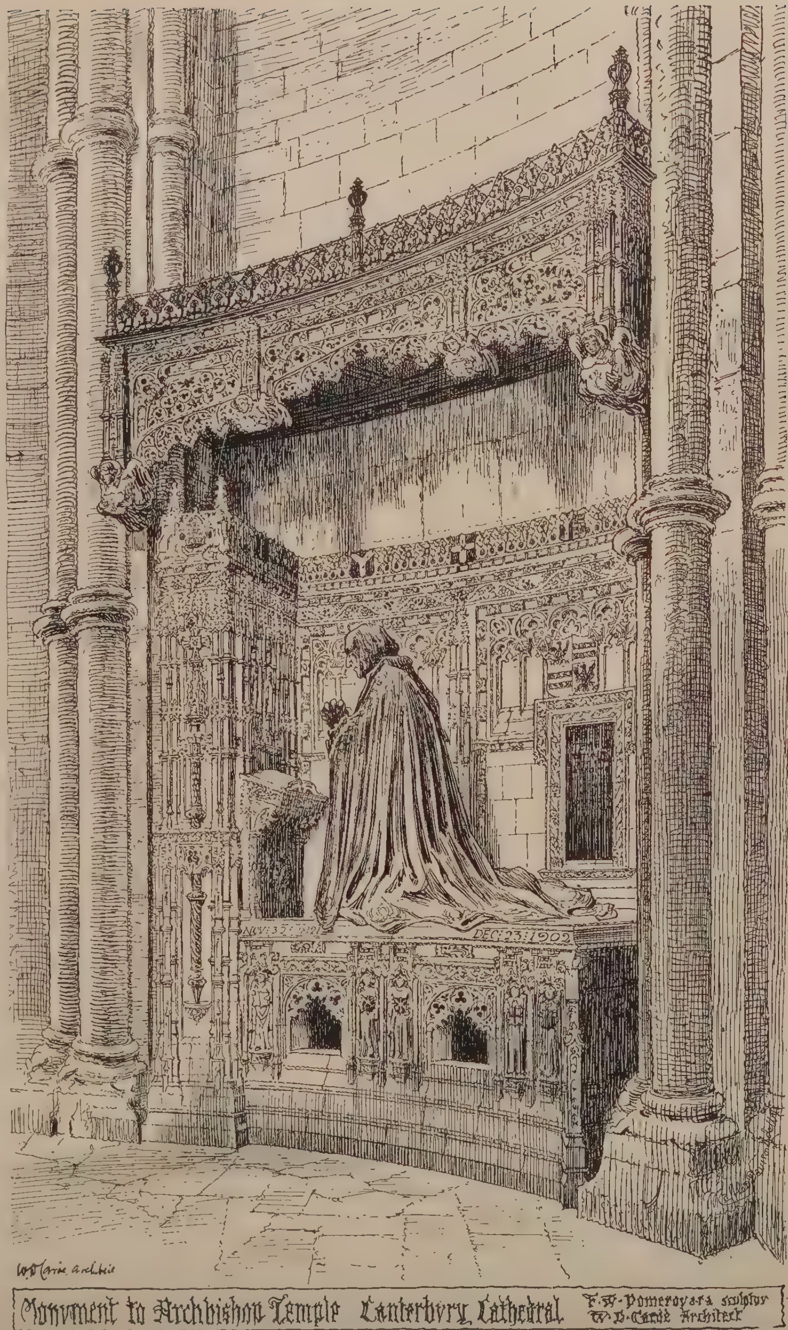
We like especially his chapter on "Rhythm," a subject too little understood or felt. Professor Varon tells us what it means and how much it signifies.

The Architects Are Busy in Texas

EXTENSIVE building programmes will be carried out this spring and summer in the different larger cities of the State. In Houston plans have been adopted for the expenditure of more than \$25,000,000 for improvements during the current year.

Included in this list are \$3,000,000 to be expended by the Houston Light and Power Company and \$4,000,000 for Houston port terminal facilities. The Galena Signal Oil Company, the Sinclair Oil and Refining Company, and the Humble Oil and Refining Company plan to spend an aggregate of \$8,000,000 in improvements to their refining plants. Several million dollars will be spent in office buildings and in residences, the cost of the latter, however, not being figured in the total estimate.

In Dallas, Fort Worth, San Antonio, El Paso, Waco, and Austin unusual building activities are in progress and planned for the next several months. In all of these cities the amount to be spent on improvements exceeds that of any previous year, it is stated. The housing problem, which was acute in the larger cities of the State, has been greatly relieved by the erection of many new residences.



From pen-and-ink drawings by Raffles Davison.

ROEDEAN SCHOOL

Mr. Davison's work is essentially different from our American forms of presentation. He never sacrifices accuracy of drawing to get effect, and his vast knowledge enables him to impart a sympathetic feeling and emphasis to the right points about his subject.

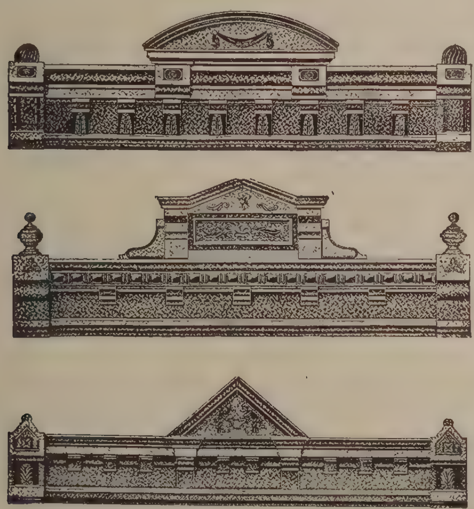
Construction of the Apartment-House

By H. Vandervoort Walsh
Instructor, School of Architecture, Columbia University

ARTICLE IV

Façade Adornments

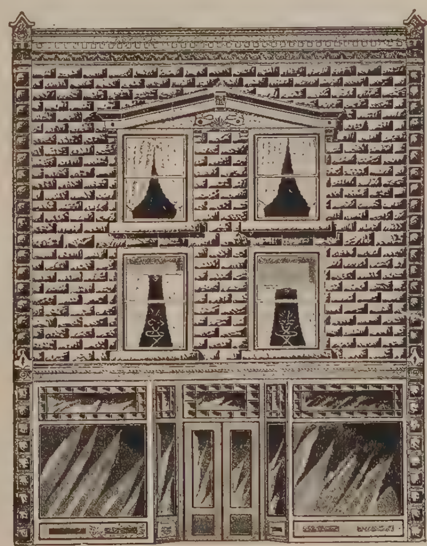
As one walks down the streets of our cities, and is at all sensitive to architectural forms, there is bound to be stirred within one a feeling of resentment against the long, ugly rows of apartment-house fronts which line the sides of the thoroughfares in endless repetition. They are like bill-



·THE·OLD·SHEET·METAL·
·CORNICE·THAT·WAS·PAINTED·
·GREY·AND·COVERED·WITH·
·SAND·TO·LOOK·LIKE·
·SANDSTONE·

boards that advertise the fads of builders, and the carelessness of investors. There are the old, dingy, pressed-brick fronts, that were built of bricks so accurate that later generations were forced to paint over them and mark out in white lead artificial masonry joints to hide the perfected ugliness underneath. The age of wriggly stones and cabbage and Brussels-sprouts ornaments is evident upon the façades of another street. Across the way are relics of the galvanized-iron-cornice days . . . bold days when they pressed from sheet-metal classic cornices or French dreams, painted them with gray pigment and stuck grains of sand in the linseed-oil vehicle, so that one might feel tempted to say: "How very much like sandstone that cornice is." And then there are those broken cast-iron balustrades and columns along the fronts of other apartments, their arises worn of the faun-colored paint, where lazy people have polished with their clothes the black metal beneath—relics of the days when department-store fronts were made of cast-iron after the dream of a fervent American engineer who had visited Venice, and decided that the beauty of her buildings could easily be reproduced in the United States in cast-iron.

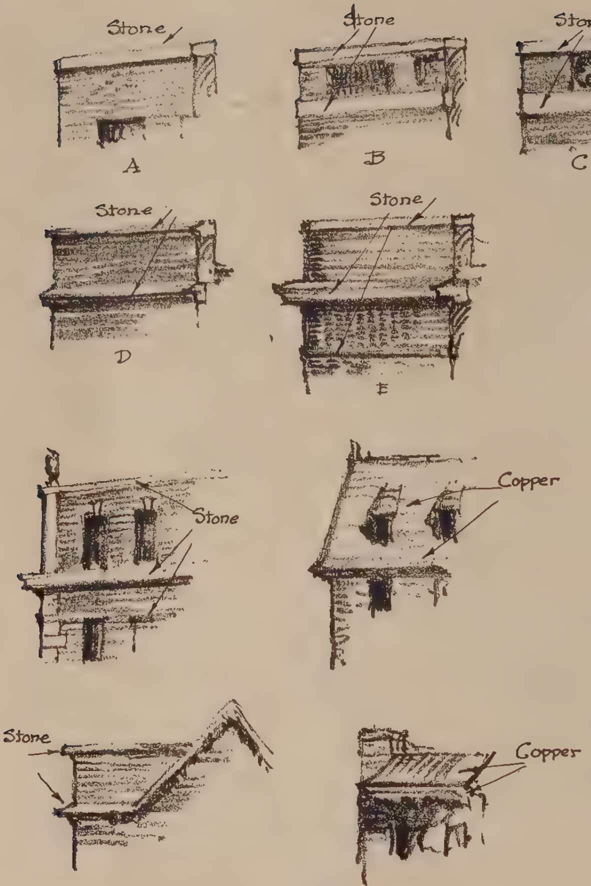
Passing to a newer section, one is at least gratified to see that "up-to-the-minute" speculative apartments do not have sheet-metal cornices any more. In fact, many do not have any cornices at all. A bold step forward in design, you say! No, an economic necessity. Tin and iron cornices were found expensive to keep in repair, and this of course touches the investor's pocket-book. But still those sheet-metal adornments are gone, and it matters little why, except that there is danger that some enterprising copper salesmen will convince builders to use them again. Passing down the street further one sees groups of apartments having doors and windows and cornices of cast, concrete stone in imitation of granite. Imagine the enthusiasm of the builder who first used this, and found it cheaper than the stone he had been buying. Then another group shows how another builder found terra-cotta to be a cheaper way of dressing-up the front. Limestone, sandstone, and granite also have their day with these men of constructive genius and of native bad taste. Indeed the faces of these apartments reflect the history of building material prices, the foibles of contractors,



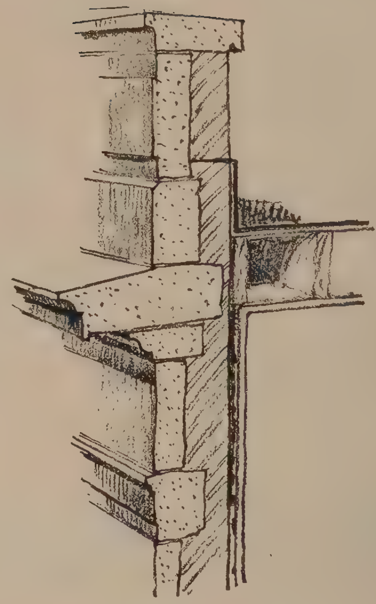
·EVEN·NATURE·PUT·AN
·END·TO·THESE·
·WITH·RUST·

the fickle and indifferent taste of the public. Only now and then does one stumble across an apartment front which is straightforward, clean-cut, simple, and of satisfying design.

We do not wish to discuss here the sad tale of architecture which is stamped upon the fronts of these buildings,



EXAMPLES OF TENDENCIES IN CORNICE CONSTRUCTION ON APARTMENTS



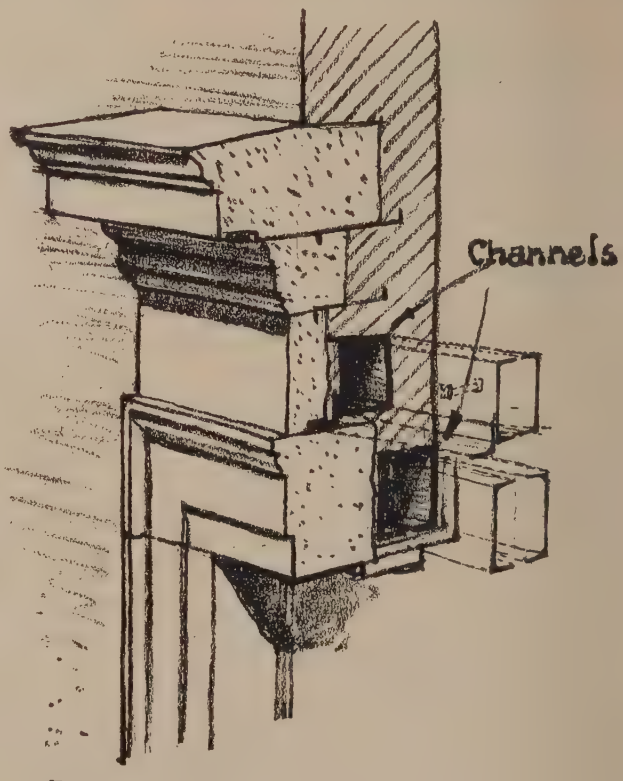
TYPICAL STONE CORNICE

but rather to report what are certain tendencies in architectural adornment and consider the construction which is prevalent.

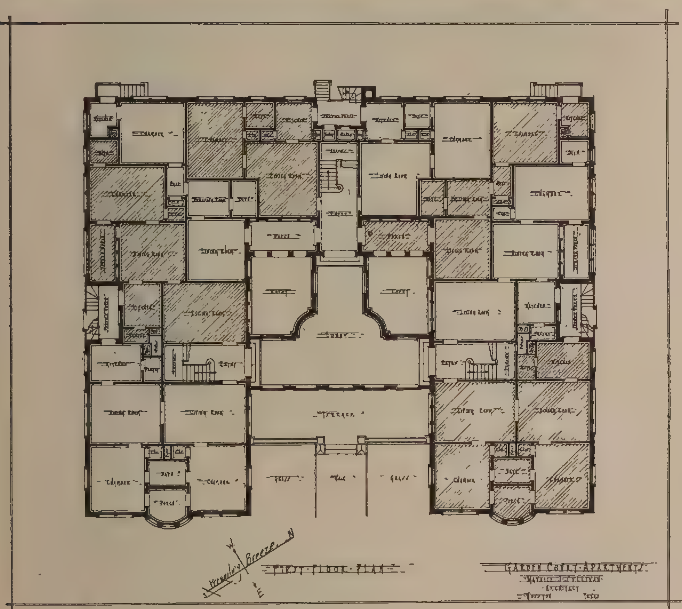
If one considers the façades of the ordinary apartment, there is little for architectural treatment. A front door, windows, a few string courses, a cornice or a coping—these are the elements which must be trimmed to make the impression.

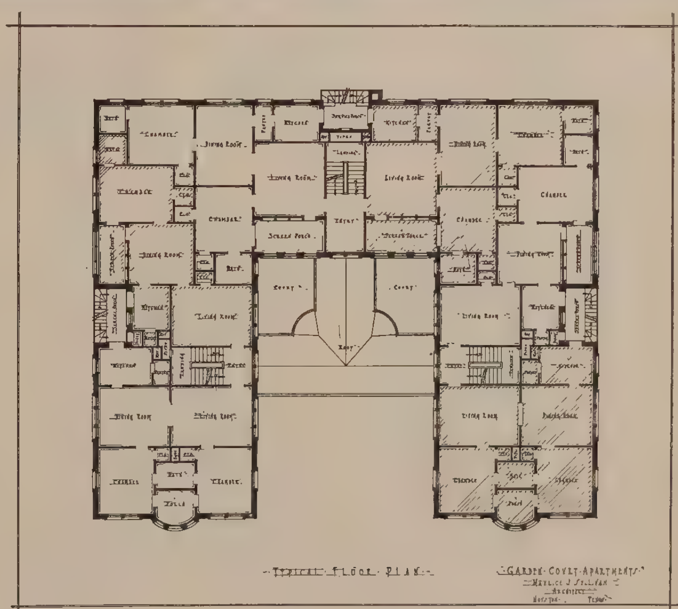
It is the front door that receives a good deal of attention, generally, to-day. It conforms to our prevalent philosophy that clothes make the man. Well, the front door makes the apartment, believes the builder, the investor, the real-estate man, and the lender of the building money. It must be lavish, they say. It must make the thirty-dollar apartments within look like ninety dollars. And so, stained glass is used, fine cut stone, tiles, ornamental ironwork, and the like. Serious effort is made to create doors which are different, that have individuality. But there really is not much of this, when one analyzes the fundamental shapes employed—the arch, the door framed with mouldings, or this frame surmounted with a cornice, or the whole framed with columns and cornice. Good, old, substantial architectural ideas, but worked out usually in a spirit of modern carelessness, linked up with cheap and gaudy trinkets of ornament.

Consider the treatment of windows (page 164) in the elevations of these apartments. As in all architecture, there are only a few fundamental ideas, which are handled in various ways. In one of the drawings are shown these primary architectural forms for window-openings. The simple opening with a lintel and sill (*A*), or the opening framed with blocks on each side as (*F*), or the lintel stone and sides and sill converted into mouldings which frame the opening (*E*), or this opening frame crowned with a cornice supported by consoles as in (*G*), or not so supported as in (*H*), or these mouldings are carried only partly down the sides as in (*I*). These fundamental forms take on various shapes, as is shown in the other drawings. There may be no lintel shown at all, but the bricks carried right over the opening upon a steel lintel, hidden in the masonry, or a soldier course of bricks



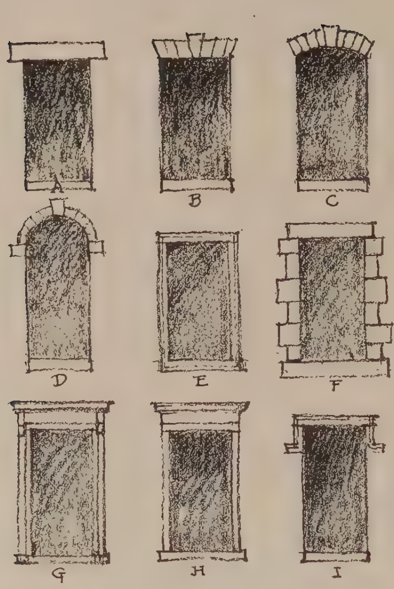
Door Construction



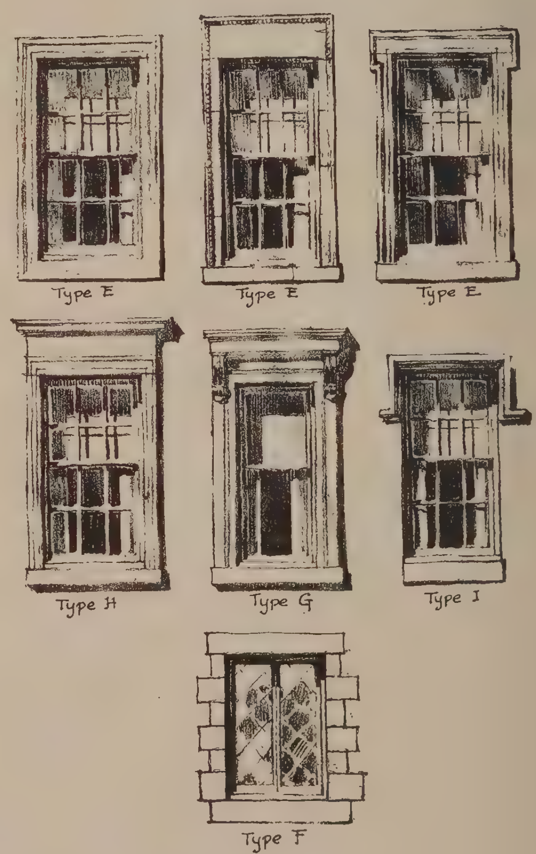


GARDEN COURT APARTMENTS, HOUSTON, TEXAS. Maurice J. Sullivan, Architect.

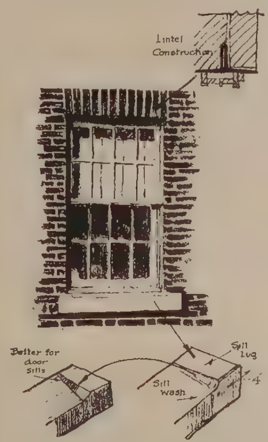
First-floor plan marked to indicate direction of prevailing breeze and arrangement of apartments for maximum advantage in warm climates. This is the great problem in apartment-houses in Southern cities.



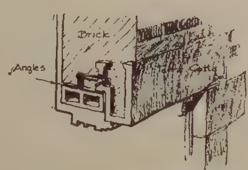
·PREVALENT·IDEAS·FOR·TREATING·
·WINDOW·OPENINGS·IN·APARTMENTS·

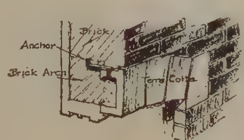


may march proudly over the top upon a steel angle, defying all the apparent laws of gravity. Stone or terra-cotta lintels that have steel within them may do other curious things in these days of miracles, such as showing no bearing at their ends, but being cut off to the exact width of the window, and butted against two square blocks having rosette ornaments in their centres. Some of these curiosities are presented in the drawings, and represent, not unusual practices, but the typical. In fact, the illustrations include about all the known ways of treating apartment windows to-day.



But then there is the arched opening. The real semicircular arch (D), the segmental arch (C), and the flat arch (B). Of course one finds more variations of the flat arch than the others, for this brings into use the marvellous thing—you doubt it?—the steel lintel. Flat arches of bricks with and without keystones, flat arches of terra-cotta and stone with and without keystones, and flat arches of brick and stone with and without keystones surround one on all sides. It is so easy to build it. What architectural tricksters we have become since that steel lintel was found! The drawings show it all. Even if it is a real stone lintel, we are allowed to place upon it only its own weight; the back of the wall must be supported on steel or upon a relieving arch in the brickwork.

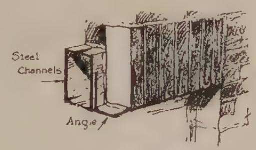


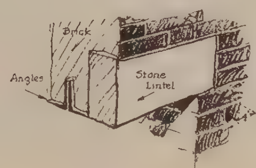


But now, look above these windows to the tops of the walls. There is a wall finished only with a coping-stone. Boldly simple, you may remark. A belt course may be placed below it where a cornice ordinarily should be, and balustrades or panels may be used between. A real belt course of diminutive cornice quality may be employed, or now and then a real cornice may be discovered among the up-to-date middle-class apartments. One curious fad is to place a whole story above the cornice, as though to fool the public as to the height up which it needs to climb to the top floor. A collection of cornice tendencies have been made in the drawings to show these efforts of design, and a real cornice, naturally built, is shown in cross section.

Lintel Construction of Stone

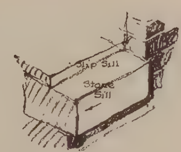
Where real stone lintels are used, a bearing of about 4 inches should be designed. It is best to make this bearing as small as possible, considered from a structural and artistic point of view. Wherever there are long, self-supporting stone lintels, over which the face of the wall is supported on steel, it is important that a clearance space be left below this steel, so that there will be room for it to deflect and not come down with its load upon the upper part of the stone lintel.



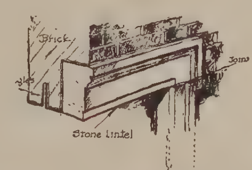


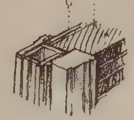
Arches of Stone

Usually arches employed over openings in apartment-houses are built of stones which are not the total depth of the wall, but thick enough to show a reveal of satisfying appearance. This usually requires that these stones be made 4 inches thicker than the ashlar blocks. The joints should be made about one quarter inch thick to make a good bed for the stones.



Sills





There are two types of sills: lug sills and slip sills. Where lug sills are used, they should on an average be only 2 inches wider than the space between jambs when walls are faced with ashlar, but 4 inches wider when faced with brick. All sills should be cut with a wash, about three-quarter-inch on ordinary work. The projection of the sill beyond the face of the wall is usually about $1\frac{1}{2}$ inches, and it is made to slip under the wooden sill of the window about 1 inch, although 2 inches is better.

Sills for doors ought to have the wash, at the lugs, cut with a bevel, instead of a scotia, as for window-sills.

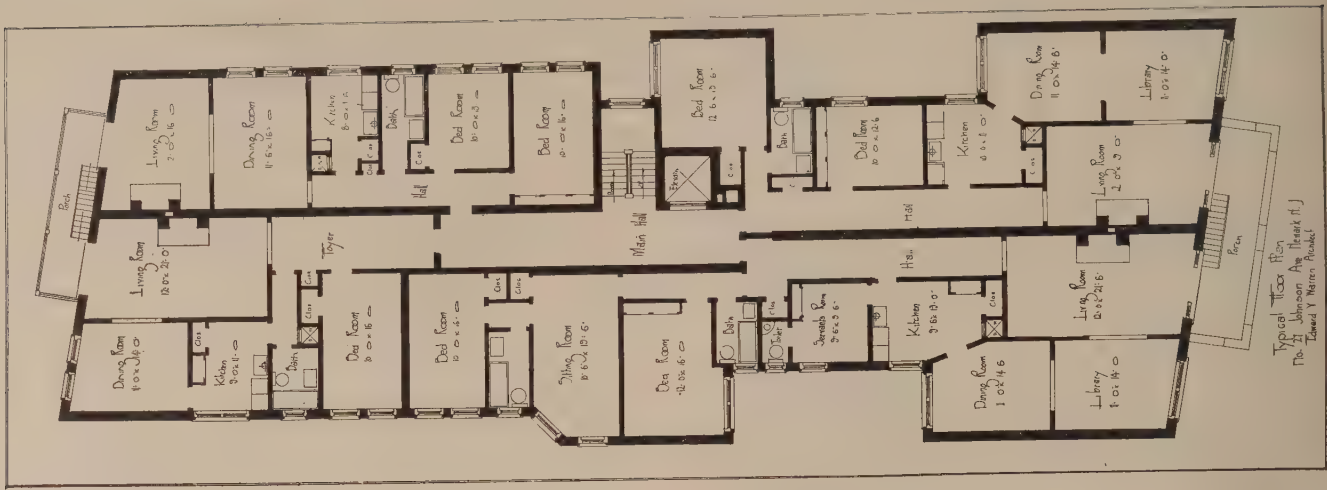
Copings, Cornices, and Belt Courses

The most important part of the construction of the coping is the making of the joints water-tight. When the stones are set, the vertical joints are left dry. They are then caulked with picked oakum, and filled with grout consisting of one part of non-staining cement, one part fine white sand.

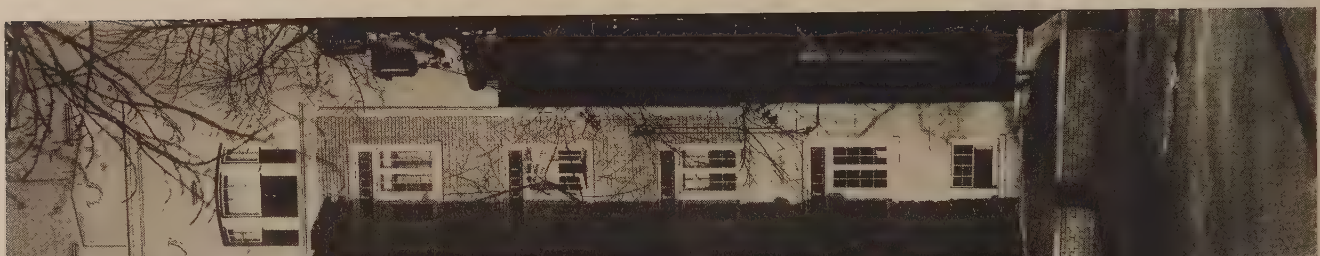
(*To be continued*)

Mr. Royal Cortissoz, the Art Editor of the *New York Tribune* and one of the most inspiring and encouraging writers on American art, will be one of the chief speakers at the Convention of the American Institute of Architects, Washington, D. C., May 16-18. Mr. Cortissoz always has something to say and his attitude and dignified ridicule of modern art fads are a wholesome and chastening influence for sanity and a respect for honest work.

The International Exhibition of Contemporary Paintings at the Carnegie Institute.—The Twenty-second Carnegie Institute Annual International Exhibition of Contemporary Paintings will open this year on Aptil 26 and continue through June 17. The exhibition will consist of some three hundred paintings. About one hundred and seventy of these paintings have come from abroad and one hundred and thirty from points in the United States.



Edward V. Warren, Architect.



ROBERT TREAT APARTMENTS, NEWARK, N. J.

Some Home-Made Bookcases

By Murray P. Corse, Architect

GENERAL REMARKS FOR ALL TYPES

Woods. Birch or a medium soft mahogany among the hardwoods may be employed; the former is somewhat less expensive and takes either paint or stain well. The amateur will find whitewood considerably easier to work with; but it is soft and will dent or mar easily and show signs of rough handling. The amateur is advised to select the wood that is adapted to his degree of skill. When paint is used, nails may be employed on exposed surfaces; they should in any case be countersunk and the hole filled with putty; when using stain or wax or oil finish try to glue pieces together where they cannot be "blind-nailed."

Painting or Staining. The question of finish is generally determined by surroundings. Painted bookcases as a rule harmonize better with the average rented house or apartment. Paint, furthermore, will cover a multitude of sins and defects of workmanship. For color, be guided by the room and the other furnishings; but keep in mind the two principles of *harmony* and *contrast*. Thus, in a room where there are already contrasting colors, as between the wall surface and the trim, the bookcases may be painted like the wall surfaces, to be inconspicuous, or else to stand out like the trim. Do not fall between the two. (*Note:* White is not recommended as a desirable color for bookcases. It soils easily, nor does it set off to advantage the rich bindings.)

In a Jacobean type of room, however, or in company with oak or walnut furniture, a stained finish may be desirable. This requires more careful workmanship. If any nail-holes show (and they must be very small), they should be filled with a putty colored to match exactly the finish desired. Birch may be stained, not to imitate but to harmonize with either walnut or oak, or even mahogany. If the surroundings justify it, an oil or wax finish is effective—see advertisements—or even no finish at all. This necessitates a careful selection of wood as well as faultless workmanship.

Mouldings shown are all "stock," and may be obtained of a carpenter or frame-maker. The doors in 1 and 3 had better be made in a mill, or by a carpenter; the amateur will find them very difficult to manage. Shelves may be of half-inch stuff if less than three feet long, of seven-eighths if more. Four feet six is about a maximum length without additional supports.

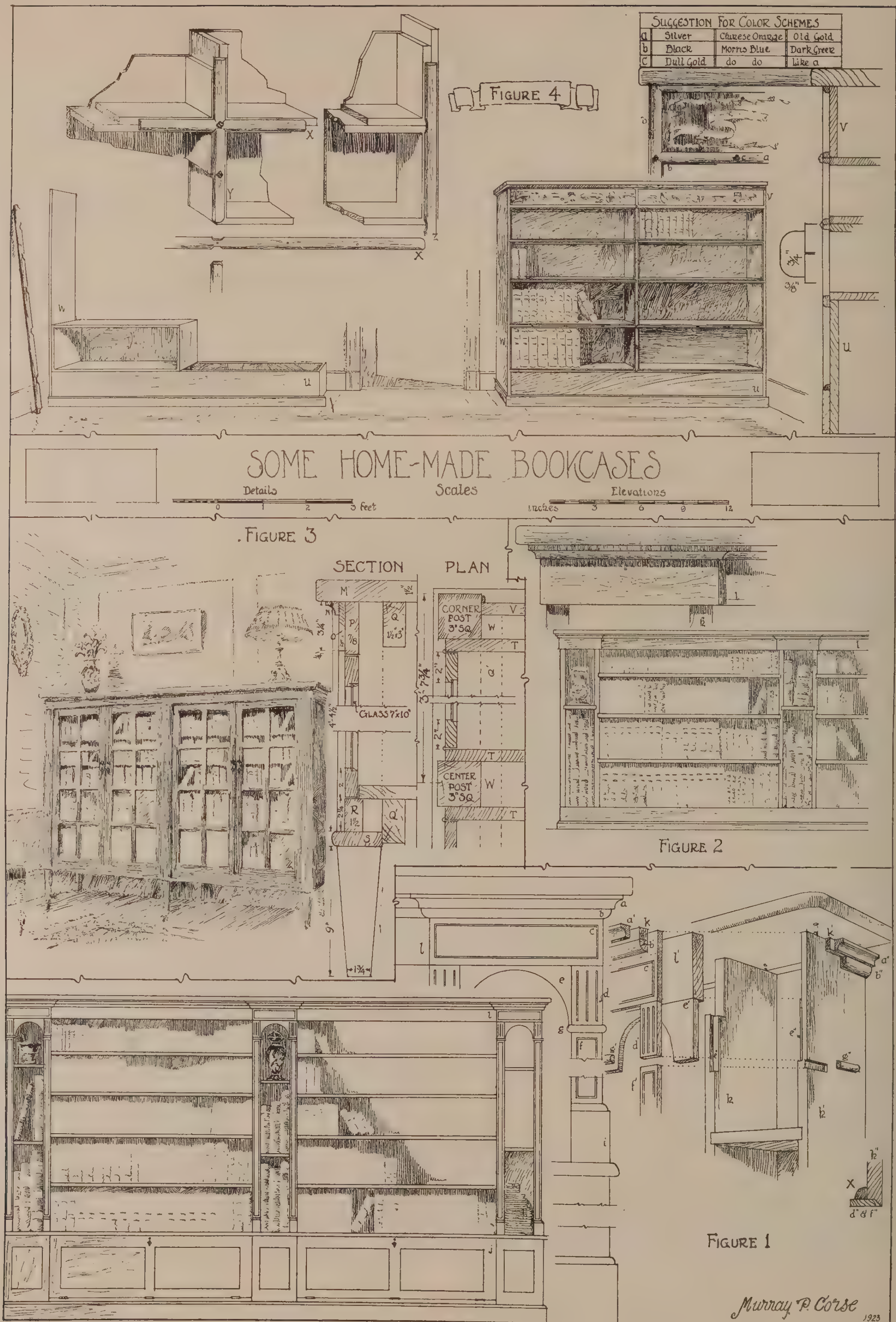
The Top should in each case be chosen with especial care, of thoroughly seasoned wood, for if it warps the result is most annoying. An old counter top (from some former bar!) may often be found in a wrecking shop, but it cannot be refinished by planing or scraping on one side, as it will curl. These tops are frequently of cherry, which goes well with mahogany body, a fact that the Colonial cabinetmakers understood.

Firmness. To be practical, the whole should be put together in the solidest manner possible. The uprights, h, in Figures 1 and 2, should run from top to bottom without interruption; a board 1 (or P in Figure 3) of a single piece if possible, or firmly joined, should be "let into" these, that is, they should be cut away to receive it, and solidly nailed; the shelves also are shown "let in." This has the disadvantage of making the shelves immovable, of a fixed height; it is also a hard bit of joinery to execute; if you are confident of the solidity of your construction without it, a better way is to bore a series of holes in the sides, and rest the shelves on little pegs, or metal pieces supplied by the hardware stores for that purpose.

Figure 1. For a rather large, formal room. May be either painted or stained. The narrow compartments are found of great convenience for books too tall to fit the other shelves, for magazines, bric-à-brac, etc. The cupboard space underneath is invaluable. (This may project six inches more into the room, if desired.)

The method of construction is shown above. The piece 1, as described, should run from end to end, and be let into the uprights, h, which are cut away to receive it, and to which it is firmly nailed. The end upright, h', is only half cut through, for the sake of a better finish. The nail-holes are covered by c, which may be nailed at the top under b, and blind-nailed at the bottom, where d' will come and cover it. d' should be glued to e'; it may also be screwed on, or nailed from back to front so that the nails do not come all the way through. The whole may then be let into the slots e''. Similarly f should be attached to a bit of blocking, x, which can be nailed afterward to h''. (See the detail below, where a better method of joining the finishing pieces is shown by mitring d'' and f''; a method, however, that few amateurs would care to attempt.)

The mouldings a' and a'', b' and b'' should be mitred, not cut off flat as shown. These two can be obtained in a single piece, thus dispensing with the block k, but it requires considerable skill to handle it. Similarly, the mouldings g', g'', are mitred where they return; but g should be cut off flat where it comes next to the books. Caution: if these mouldings are obtained "in stock" they will probably be pine, which may refuse to take a stain matching the others. Some preliminary experiments will be necessary to determine this.


SUGGESTION FOR COLOR SCHEMES
a Silver Chinese Orange Old Gold
b Black Morris Blue Dark Green
c Dull Gold do do Like a
FIGURE 4
SOME HOME-MADE BOOKCASES
Details
Scales
Elevations
0 1 2 3 feet
inches 3 6 9 12
FIGURE 3
SECTION
PLAN
CORNER POST 3" SQ.
CENTER POST 3" SQ.
GLASS 7"x10"
FIGURE 2
FIGURE 1
Murray P. Corse
1923

Sizes. *c*, *d*, *e*, *f*, and *i* may be of half-inch stuff; 1 should be seven-eighths, while the uprights, *h*, and the top should be at least an inch and a quarter. The doors, *j*, as stated, might be made by a carpenter; they should be carefully tenoned and wedged, and hinged at the bottom to drop forward. However, if you can find an old piece of board of the right size which is thoroughly weathered and guaranteed never to shrink, swell, or warp, they may be made of a single piece, and the panels either engraved or painted on, like the groves on *d* and *f*.

Figure 2. This is similar in principle to the preceding with the narrow compartments for high books; but it may be lower, less decorative, less formal. Suitable for low rooms, garrets with sloping ceilings, bungalows, summer camps, etc. Variations may be introduced by having only the two ends of narrow compartments; intermediate divisions, if such are necessary, of a single board. This would be more suitable for staining or leaving in the natural finish, as no nail-holes need show. The construction will be understood by referring to Figure 1.

Figure 3. More formal, for Georgian type of interior, birch with mahogany finish or mahogany. The three front posts with tapering legs should be cut in a mill. The rear posts are less important. The doors also will probably have to be made outside the home. Instead of "letting in" the pieces *P* and *R*, as a carpenter would do, the amateur will find it easier to nail two bits of studding, *Q′* and *Q′*, firmly to the back of the posts. Then *T*, a single board, the full height, and twelve inches broad, and notched around both *Q′* and *Q′*, is nailed to the front and rear posts. This wastes the space at *W* and *W′*, but makes a firmer job, and prevents the books from striking on corners as they are taken out. Then the bottom shelf in two sections is nailed to *Q′* and its corresponding stud at the rear, and the top *M* doweled into the six posts, as in Figure 1. (To place dowels correctly, first bore dowel holes in posts, exactly in centre of these insert needles projecting about a quarter-inch above surface; put on top carefully and force down; the needles will mark the centres for the holes.) *P* and *R* need only be inserted between posts and nailed to bits of blocking, *O*; however, the finish piece should be "let in" both front and sides, while *S* may be notched around the posts and mitred at the corners. (*Note:* The rear posts will have to be cut away thus, to admit the boards at the back, which are essential to the strength of the whole.)

Figure 4. This might be called the "Nomad's Delight." It was invented by a friend who was forced to move every year or two—like so many of us lately! It consists of nothing but a series of boxes; the lower two, in this case, were made to fit a particular set of books. When moving, the books are packed right in their own cases; if by van, without even being wrapped; if by freight, it would be necessary to protect the corners with a simple crate, and to add a cover. On reaching one's destination they may be set up immediately, and the books put back without loss of time.

As illustrated, the joints are concealed by strips of moulding. The horizontal strips *X* should be continuous, mitring into the two end strips *Z*. The other vertical strips, *Y*, are fitted in between. To cover the end joints, a board, *W*, is set up, lightly nailed at the top and bottom, also attached at the back by strips of metal if it show a tendency to warp. *U* and *V* are vertical boxes, without top or bottom, which serve as base and cornice. The mouldings may be attached by fancy upholsterer's nails, thus taking part in the decorative scheme. They go back into the same place after each move. They may be flattened out and so slip in the joints; the weight of the boxes will hold them.

The boxes themselves should be made at a box-factory. Experience has demonstrated that half-inch stuff is heavy enough; but they should be made with the greatest care. The mouldings also must be cut with the greatest precision. Many varieties are possible; only the simplest type is here shown.

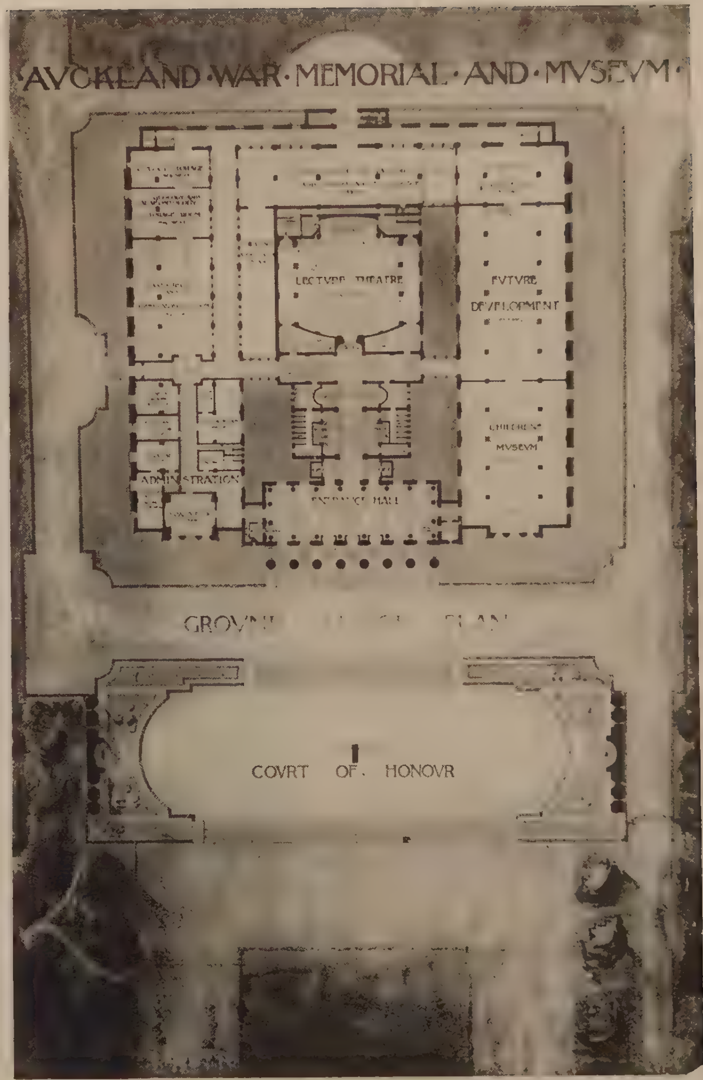
Endless decorative effects may be obtained. Three color schemes are indicated. My friend, being something of a mediævalist, painted a heraldic frieze on the surface *V*; on a black background, coats of arms in primary colors with scrolls. This frieze might, perhaps, be better carved; the too vivid color detracts something from the bindings. A stencil design can be applied; the possibilities for a nursery bookcase are self-evident. The exposed surfaces of the end pieces *W* may also be decorated.

Winners in Hospital Contest Announced

BUTLER & RODMAN, of New York City, received the first prize in the international competition recently conducted by *The Modern Hospital* magazine for the plans of a small general hospital. Three awards of $500, $300, and $200 and two honorable mentions were made.

Second and third places in the contest were won by John Roth, of Atascadero, Cal., and Ernst Hoedtke, of Cambridge, Mass. Selection was made from fifty-one sets of plans submitted by hospital architects of the United States, Canada, and England, judgment being on the bases of economy in construction and operation, integrity of designs, health values, and flexibility.

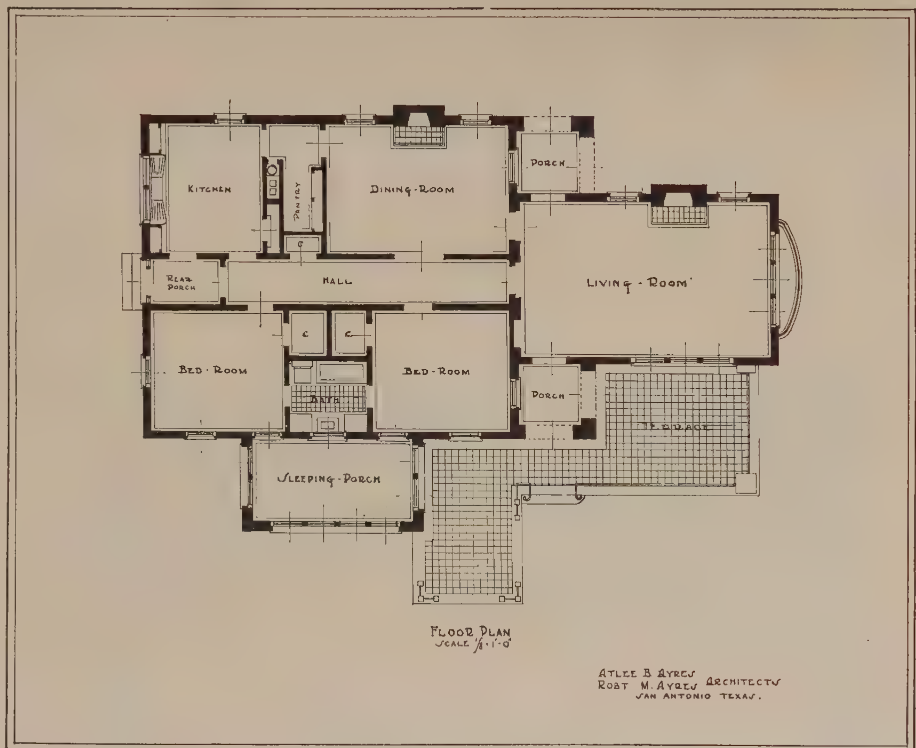
Cervin & Horn, hospital architects of Rock Island, Ill., were given first honorable mention in the competition, the other honorable mention going to Lemuel Cross Dillenbach, of the School of Architecture, University of Illinois.



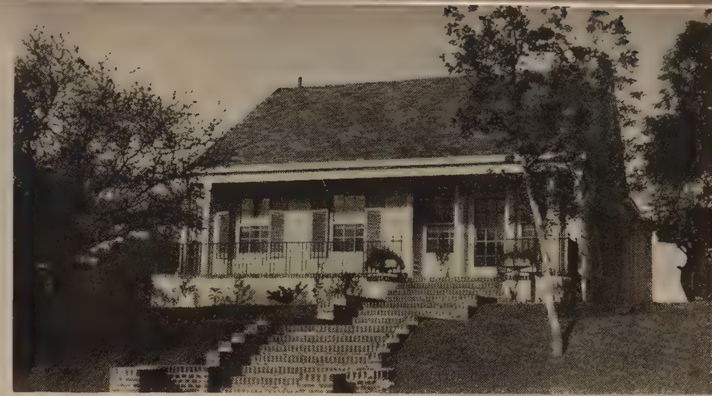
WINNING DESIGN, WAR MEMORIAL AND MUSEUM, AUCKLAND, NEW ZEALAND.

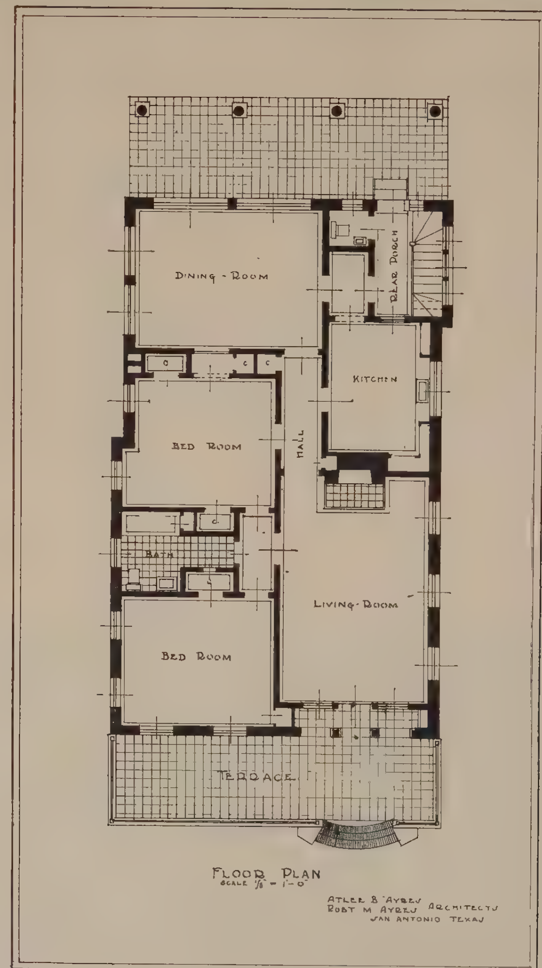
Grierson Amier & Draffin, Architects.

The winning architects, in the report accompanying their design, state their conception was influenced by the fact that the site for the museum gave a magnificently commanding position. This was strikingly reminiscent of the acropolis at Athens. The classical building, of three stories, will be seen from afar, and thus a simple composition of strong light and shade was determined upon. The architects have adhered to the Grecian Doric style, which, while meeting all the demands of a commanding site, yet presents at close range a quiet dignity of the refinement essential for memorial purposes. Its simplicity has the practical advantage of being inexpensive in construction.

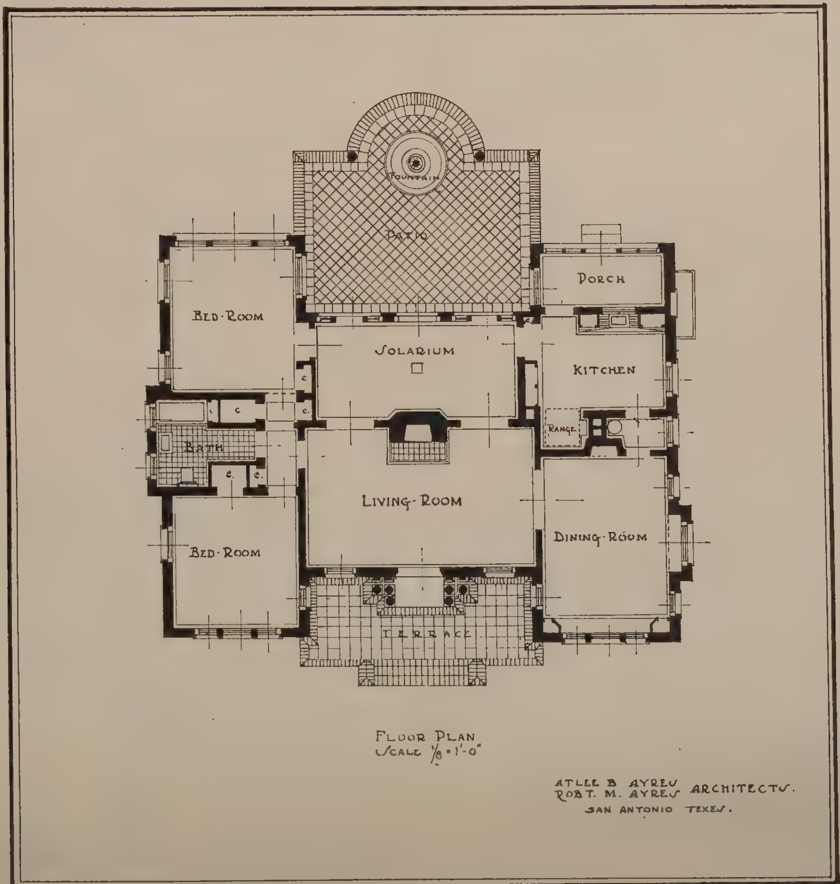


HOUSE AND PLAN, MRS. WALLACE NEWTON, SAN ANTONIO, TEXAS.
Atlee B. Ayres, Robert M. Ayres, Architects.

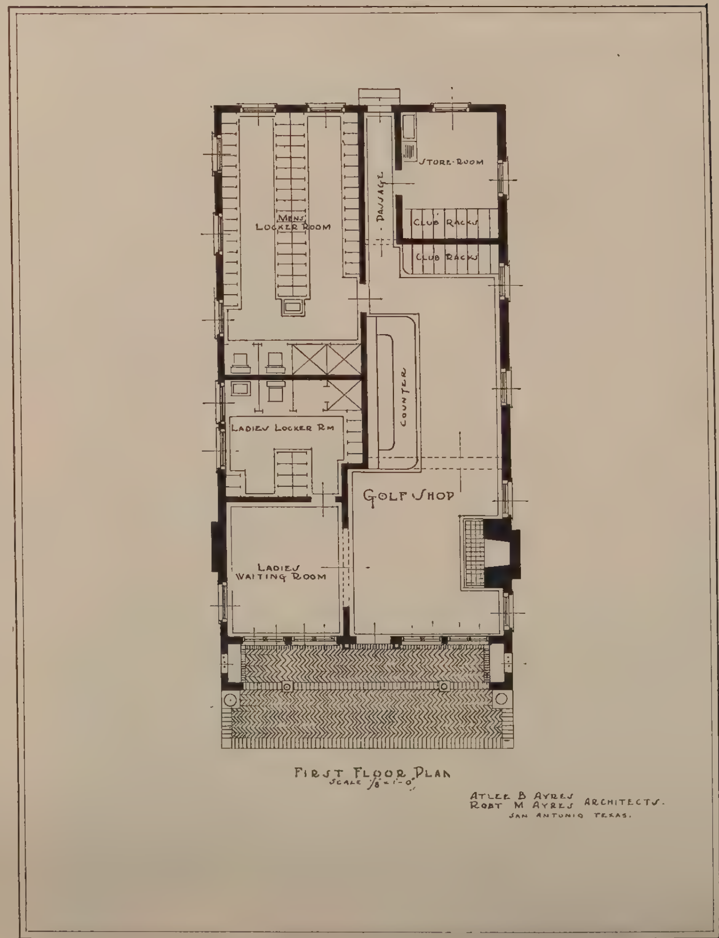




HOUSE AND PLAN, GUSTAVE KRAY, LAUREL HEIGHTS, SAN ANTONIO, TEXAS.
Atlee B. Ayres, Robert M. Ayres, Architects.



HOUSE AND PLAN, ATLEE B. AYRES, JR., SAN ANTONIO, TEXAS.



SYMONS GOLF SHOP, SAN ANTONIO, TEXAS.

Drafting-Room Mathematics

By DeWitt Clinton Pond, M.A.

SEVENTH ARTICLE

IN the last article there was discussed a problem in which it was necessary to determine the length of one side of a five-sided lot. Plots of ground of this type are not uncommon but are not often found in cities where the plan of the municipality has been developed in the ordinary manner of having the avenues running in one direction and the

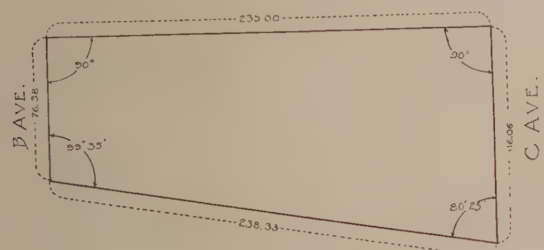


FIGURE 27

streets running in a direction perpendicular to the avenues cutting the city into rectangular blocks. In a city the lots are usually parallelograms or trapezoids if they are not rectangles, and at least two sides are parallel so that the plot can be divided into right triangles. The formulas which are used in connection with lots of this type are more simple than those used in the last article, but there are problems encountered where city lots seem more complicated.

In Fig. 27 is shown a plot of ground on which a large corporation wanted to build a commercial structure. The angles and dimensions given in the figure are the same as those given in the survey. It can be seen that A Street cuts B and C Avenues at an angle. The two avenues are parallel and the inside lot line is perpendicular to them. The distance between the avenues is 235 feet. Owing to the fact that A Street is not at a right angle to the avenues, the distance along the street is 238.33 feet, and the frontage on B Avenue is 76.38 feet and on C Avenue is 116.06 feet. The angles are 80 degrees 25 minutes and 99 degrees 35 minutes as shown in the figure.

Upon this plot the owners desired to erect a building having an interior court of the shape and about the size shown in Fig. 28. The column spacing was determined by the type of equipment that the owners desired to place in

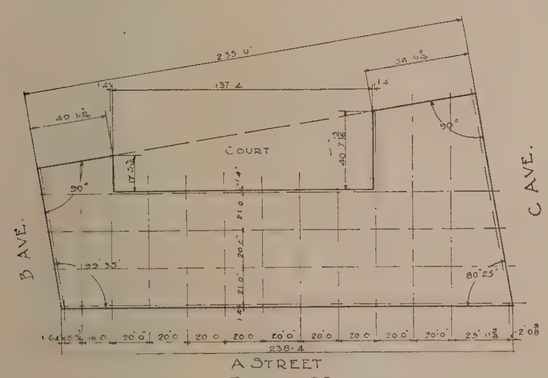


FIGURE 28

the building and for this reason the columns were spaced as far as possible 20 feet on centres in both directions. The exterior columns were located 1 foot 4 inches back of the building line or wall line in the court, except in the corners, where the columns are placed 1 foot 9 inches back from the building line.

By observing Fig. 28 it can be seen that the length of the court is determined by the column spacing. There are seven bays or panels along the court and the distance from the column centre line along one court wall to the centre line along the opposite wall is 140 feet. If 2 feet 8 inches is subtracted from this length, the dimension from wall to wall is 137 feet 4 inches, as shown in the figure. The lengths of the other two court walls are not so easily determined. The lengths of the two portions of wall along the lot line must also be found, as it is necessary to determine the dimensions of all sides of the building.

The architect, confronted with such a problem, would lay out his plot in a diagrammatic manner, with all the angles exaggerated, similar to that shown in Fig. 29. He would then make note on his diagram of the dimensions which are

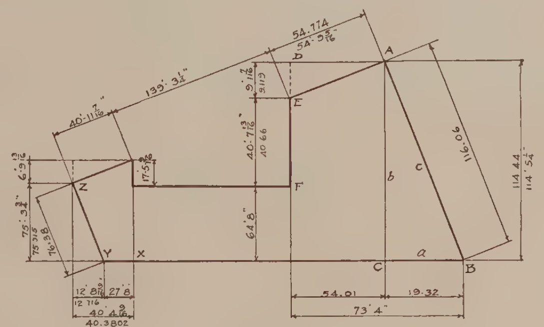


FIGURE 29

already known and divide the plot into right triangles in which one side and one of the acute angles are known, or can be determined, so that the second or third sides can be found. As the plot is a trapezoid in which there are two right angles, all the triangles developed in the diagram will have the same known angle to work with. This angle is the complementary angle of 80 degrees 25 minutes, or 9 degrees 35 minutes.

It will be seen that there is a triangle at the right of the diagram in which the hypothenuse is 116.06 feet long and the angle is the same as stated above. It will be possible to determine the two other sides. The distance from the corner at the intersection of A Street and C Avenue to the court wall can be determined from the dimensions shown in Fig. 28, and by adding them as shown below.

	2 feet	$0\frac{3}{8}$	inches
	29 "	$11\frac{5}{8}$	"
	20 "	0	"
	20 "	0	"
	1 foot	4	"
Total	73 feet	4	inches

This dimension is noted on the diagram, and if the side *a* is found in the triangle *ABC*, the distance from *A* to *D* can be determined. This distance is the base of a right triangle, of which one acute angle is known, and it will be possible to obtain the lengths of the two other sides. One of these sides—the hypothenuse—is a required side of the building, and the other will make it possible to determine the length of the court wall. The dimension across the building is determined by adding the dimensions given in this direction in Fig. 28. There are three column spacings, two of 21 feet and one of 20 feet, to which must be added 2 feet 8 inches, making a total of 64 feet 8 inches, as shown. With this distance known, and the length from *C* to *A* determined, as is the side *DE* of the triangle *ADE*, it is possible to find *EF*—one of the required dimensions. This is the type of reasoning which the architect would follow in making his diagram. In the same manner he would develop the portion of the diagram at the left. In this part of his figure *XY* and *YZ* are known and all the other dimensions must be found.

Once having developed the diagram, and noting down the dimensions 116.06 feet, 73 feet 4 inches, 64 feet 8 inches, 27 feet 8 inches, and 76.38 feet, which are given on the survey or determined from the column centres, the architect is ready to start his calculations.

He first must find the logarithms of the trigonometric functions of the known angle. These he places at the top of his sheet of calculations. The logarithms are given below.

log sin	9 degrees	35 minutes	=	9.22137 − 10
" cos	9 "	35 "	=	9.99390 − 10
" tan	9 "	35 "	=	9.22747 − 10

He will also place near these logarithms those of the known dimensions.

log 110.06 = 2.06468
log 76.38 = 1.88298

The first calculation is carried through for the purpose of determining the sides *a* and *b* in the triangle *ABC*. As *c* is known and as it is the hypothenuse of the triangle, it is necessary to multiply it by the sine and cosine of the angle *A*.

log 116.06	= 2.06468
log sin 9 degrees 35 minutes	= 9.22137
	1.28605

1.28605 = log 19.32 feet

log 116.06	= 2.06468
log cos 9 degrees 35 minutes	= 9.99390
	2.05858

2.05858 = log 114.44
114.44 = 114 feet $5\frac{1}{4}$ inches

The next step is the determination of the distance from *A* to *D*, which can be found by subtracting 19.32 feet from 73.33 feet. The result is 54.01 feet as shown in the diagram. This dimension is the base of the triangle *ADE*. In order to find the hypothenuse of this triangle, it will be necessary to divide it by the cosine of the angle, and to obtain the side *DE*, it will be necessary to multiply by the tangent.

log 54.01	= 1.73247
− log cos 9 degrees 35 minutes	= 9.99390
	1.73857

1.73857 = log 54.774 feet

54.774 feet = 54 feet $9\frac{5}{16}$ inches

log 54.01	= 1.73247
+ log tan 9 degrees 35 minutes	= 9.22747
	0.95994

0.95994 = log 9.119 feet

9.119 feet = 9 feet $1\frac{7}{16}$ inches

The dimension 54 feet $9\frac{5}{16}$ inches is one of the required ones and should be used on the architect's plans.

By addition and subtraction it will be possible to obtain the dimension *EF* which is also required. The calculation is given below,

	64 feet 8	inches
+	9 " $1\frac{7}{16}$	"
	73 feet $9\frac{7}{16}$	inches

	114 feet $5\frac{1}{4}$	inches
−	73 " $9\frac{7}{16}$	"
	40 feet $7\frac{13}{16}$	inches

In this manner are determined the lengths of the sides *AE* and *EF*. The lengths of the sides at the other end of the court are found in a manner very like that used above. As there is a certain amount of variation, however, it may be of value to investigate the steps involved in the required calculations.

The side noted in the diagram as *XY* can be determined by adding the dimensions between the column centres, and the distance that the column centres are from the walls.

1 foot $6\frac{1}{4}$	inches
8 feet $9\frac{3}{4}$	"
16 " 0	"
1 foot 4	"
27 feet 8	inches

This is one of the known dimensions which should be noted on the diagram. The reader might ask as to how the dimensions of 1 foot $6\frac{1}{4}$ inches and 2 feet $0\frac{3}{8}$ inches at the corners have been established. The method of finding these was given in a previous article. At the time when such calculations as those given above are carried out these dimensions have not been determined, but the distances between the first interior column, at either end, and the corner have been established. In the case of the column centre near C Avenue the distance of 32 feet is established, and at the other end this dimension is 10 feet 4 inches. The smaller dimensions are determined later by methods which have already been given. The figures given in the diagram for the totals of 27 feet 8 inches and 73 feet 4 inches are correct in any case.

The first step taken for the purpose of finding the required dimensions near B Avenue is to determine the lengths of the two legs of the triangle having the side *YZ* for a hypothenuse. The length of *YZ* has already been given and its logarithm has been noted as 1.88298. To find the legs, it is only necessary to multiply this dimension by the sine and cosine of the angle.

log 76.38	= 1.88298
log cos 9 degrees 35 minutes	= 9.99390
	1.87688

1.87688 = log 75.315 feet
75.315 = 75 feet $3\frac{1}{4}$ inches

$$\begin{array}{lr} \log 7638 & = 1.88298 \\ \log \sin 9 \text{ degrees } 35 \text{ minutes} & = 9.22137 \\ \hline & 1.10435 \end{array}$$

1.10435 = log 12.716 feet
12.716 feet = 12 feet $8\frac{9}{16}$ inches

By adding this last dimension to 27 feet 8 inches the total of 40 feet $4\frac{9}{16}$ inches is the length of the base of a right triangle of which it will be necessary to determine the leg opposite the known angle and the hypothenuse. In order to do this, it will be necessary to divide by the cosine and multiply by the tangent.

$$\begin{array}{lr} \log 40.380 & = 1.60617 \\ - \log \cos 9 \text{ degrees } 35 \text{ minutes} & = 9.99390 \\ \hline & 1.61227 \end{array}$$

1.61227 = log 40.952 feet
40.952 feet = 40 feet $11\frac{7}{16}$ inches

This is one of the required dimensions which will be put on the architectural plans.

The last dimension to be determined by means of the trigonometric functions is the side opposite the known angle, and this is determined, as has been stated, by multiplying the base by the tangent.

$$\begin{array}{lr} \log 40.380 & = 1.60617 \\ + \log \tan 9 \text{ degrees } 35 \text{ minutes} & = 9.22747 \\ \hline & 0.83364 \end{array}$$

0.83364 = log 6.817 feet
6.817 = 6 feet $9\frac{13}{16}$ inches

By adding this dimension to 75 feet $3\frac{3}{4}$ inches it is possible to find the total distance from X, the intersection of the court wall with the lot line. This total length is 82 feet $1\frac{9}{16}$ inches. If the distance across the building — 64 feet 8 inches—is subtracted from this total, the result will be the length of the court wall—the last one to be found.

$$\begin{array}{l} 82 \text{ feet } 1\tfrac{9}{16} \text{ inches} \\ -64 \text{ `` } 8 \text{ ``} \\ \hline 17 \text{ feet } 5\tfrac{9}{16} \text{ inches} \end{array}$$

Another dimension which is placed on the architectural plans is the distance of 139 feet $3\frac{1}{4}$ inches which is shown in Fig. 29. This can be found by adding 54 feet $9\frac{5}{16}$ inches and 40 feet $11\frac{7}{16}$ inches, and subtracting the sum from the total distance between B and C Avenues, or 235 feet. It will be found that this will give the dimension shown in the figure.

As has been stated in previous articles, no set of calculations such as this should be used without having the results checked. In the present case there is a very simple check for all the figures given above. This check is supplied by determining the length of the hypothenuse of a right triangle having a base of 137 feet 4 inches — the length of the court. This hypothenuse is found by the same method as has been employed above. The logarithm of the dimension of the base — 137.333 feet — is determined. The logarithm of the cosine of the angle is subtracted from this and this will give the logarithm of the hypothenuse. It will be found that the length will check with the dimension already determined within a small fraction of an inch.

It will be noticed that in order to have the dimensions in the English system — feet, inches, and fractions of an inch — it was necessary to approximate the nearest fraction. In this process it often happens that there is a cumulative error which results in the final answer being incorrect by as much as a quarter of an inch, and when this is the case it will be necessary to recheck all the calculations. The clumsy process of converting from a decimal system to a fractional system is almost sure to result in a difference in the final result, but an eighth of an inch should be the maximum difference allowed.

It is a good practice to keep all calculations in decimals of a foot until the final result is obtained. This method does not lend itself to the cumulative effect that the constant conversion from one system to the other does.

Announcements

Raymond C. Snow & Co., architects and engineers, announce the opening of offices at 1612 Hurt Building, Atlanta, Georgia, for the practice of architecture and engineering. Manufacturers' descriptive literature and price lists and samples requested. They are the supervising architects for the G. L. Miller & Company, Inc., Investment Bond House of Atlanta and New York.

George Herbert Gray, architect and community planner, announces the removal of his New Haven offices from 367 Prospect Street to Suite 918, 921 First National Bank Building, to take effect March 12, 1923. Mr. Gray further announces that he has taken over the organization, records, equipment, and good-will of the late Leon W. Robinson as his successor.

Frank Irving Cooper Corporation, architects and engineers, have changed their address from 33 Cornhill to 172 Tremont Street, Boston, Mass.

The Carter-Richards Company, engineers and architects, formerly the Carter-Richards-Griffith Co., announce the removal of their offices from the Illuminating to the Engineers Building, New York City, March 1, 1923.

The firm of O'Meara, Hills & Krajewski, architects, 1123–24 Merchants National Bank Building, St. Paul, have opened an office at 1261–63 Arcade Building, St. Louis, and would like manufacturers' samples and catalogues.

Herbert M. Greene of the Herbert M. Greene Company, architects and engineers, of Dallas, Texas, announces that Walter C. Sharp, W. Brown Fowler, and Ralph Bryan are now associates in the firm. The firm name of Herbert M. Greene Company remains, as does the present address of 620 North Texas Building, Dallas, Texas.

Cama, Norton & Co., importers of electrical machinery, plants, devices, and appliances, Elphinstone Circle, Bombay, India (Post Box, 888), request literature from manufacturers and exporters.

Emilio Levy, architect, announces that he is now located at 366 Madison Avenue, New York City.

The Detroit Steel Products Company has opened a branch office under Mr. C. W. Moon, 22 North 5th Street, Reading, Pa., to better serve the architects and engineers in central Pennsylvania. Mr. Moon has been connected with this company for seven years as sales engineer.

L. Twinem Henderson, A.A.I.A., architect and landscape gardener, St. Clairsville, Ohio, will be glad to receive catalogues and samples from manufacturers.

Jones & Roessle, New Orleans, and Clarence E. Olschner, Shreveport, announce the formation of a co-partnership, and will continue the practice of architecture under the firm name of Jones, Roessle & Olschner, architects, with offices in New Orleans, La., Maison Blanche Building, and Shreveport, La., Ardis Building.

S. S. Godley and G. H. Godley, architects, announce the removal of their office to Room 716, the New Southern Railway Building, 307 East 4th Street, corner Sycamore, Cincinnati, Ohio.

Henry S. Lion, architect, formerly of Rouse & Goldstone, announces that he has opened an office at 75 West 47th Street, New York, for the practice of architecture. Will be glad to receive catalogues.

Mr. S. M. Colburn, for the past twenty years a member of the firm of Kees & Colburn, architects, announces the formation of a partnership with Mr. Ernest Forsell for the practice of architecture under the firm name of Colburn & Forsell, architects, with offices on the ground floor, 210 South 9th Street, Minneapolis, Minn. Catalogues and samples requested.

Philip T. Drotts, architect, wishes to announce the removal of his office from 623 Reliance Building, Kansas City, Mo., to Room 300, Reliance Building. Samples desired.

Frank D. Chase, Inc., engineers and architects, of Chicago, have established a branch office at 533–534 Title Insurance Building, Los Angeles. Manufacturers' samples and catalogues are requested.

The opening of a Philadelphia office is announced by Dwight P. Robinson & Company, Inc., engineers and constructors. The new office will be under the direction of Mr. Carl A. Baer, Member American Institute of Electrical Engineers, who was recently with the firm of Baer, Cook & Company, engineers, and a consulting engineer in the design of industrial, textile, and power plants.

The International Casement Co., Inc., are to be congratulated upon their beautiful and useful catalogue. It is one of the best, most dignified, and considered pieces of publicity we have seen for a long time.

John F. Strobel announces that the firm of Crandall & Strobel has been dissolved, and that he will continue the practice of architecture at 622 Ellwanger & Barry Building, 39 State St., Rochester, N. Y.

Franz & Bond, architects and engineers, 189 High Street, Holyoke, Mass., have dissolved partnership, due to the appointment of Mr. Philip E. Bond as city engineer. Mr. Fred H. Franz will carry on the business at the same address.

F. W. Seidensticker, consulting engineer, announces the opening of offices at 64 East Van Buren Street, Chicago, February 1, 1923.

Alvan E. Small desires to announce to his clients and friends that he has associated with him Mr. John J. Flad, and that they will retain offices in the Ellsworth Block, Madison, Wis., and continue the practice of architecture under the firm name of Alvan E. Small, architect, and John J. Flad, associate.

Henry Wilkinson and Maxwell Hyde, architects, 114 East 28th Street, New York City, will be glad to receive manufacturers' catalogues. They have formed a partnership with offices at the above address.

H. R. Temple, architect, announces that on January 1, 1923, F. E. Berger became associated with him for the practice of architecture under the firm name of Temple & Berger, 304–305 Lincoln Building, Champaign, Illinois.

The Ventilouvre Company are now located at their new offices, 405 Lexington Avenue, New York City. An interesting circular showing details of the use of their product in doors and in transoms has just been received.

Palmer Rogers announces the removal of his office from the second to the sixteenth floor of the Architects' Building, 101 Park Avenue, New York City.

The paragraph about "Lipton" Steel Windows in the April number of course should have read "Lupton," and we feel sure that the firm of David Lupton's Sons Co. is so well known that the mistake was obvious.

Change in the Offices of I. P. Frink, Inc.—The offices of the representatives for I. P. Frink, Inc., in Cleveland and Cincinnati have been changed. The Cleveland office is now 992 The Arcade. The Cincinnati office is 601 Second National Bank Building. A new office has also been established in Buffalo, with an address at 310 Mutual Life Building.

"The Diary of the House in the Woods as Kept by Katharine McDowell and Husband Ned," published by the Lowe Brothers, Dayton, Ohio, is a most attractive little story about a well-equipped and charming home. It tells of the building of the house and the all-important subject of decorating it in good taste.

Robert C. Duncan, 811 Security Building, St. Louis, Mo., announces the opening of his office for the general practice of architecture and landscape architecture. He has had an exceptionally fine experience as landscape architect of the Division of Parks and Recreation of the city of St. Louis.

The two attractive illustrated pamphlets from the Albert Peck Co., Chicago, "White Door Beds and Space-Saving Devices" and "School Cafeterias," are sent to architects upon request.

We have received from A. J. Cardridge and Harold Bradley their handsomely printed "Directory to Apartments of the Better Class Along the North Side of Chicago." It contains photographs and plans of interest to architects.

"Tributes from the Tribunal" is the title of a booklet issued by the Thompson Starrett Co., containing illustrations of a number of important buildings they have constructed, with letters of appreciation from architects and owners.

The Carney Co., cement makers, are sending out a handsomely printed booklet telling of their products.

The National Steel Fabric for stucco exteriors, solid partitions, walls, ceilings, and for porch and bathroom floor construction, is being extensively specified as a new facement and base. It is manufactured by The National Steel Fabric Co., Pittsburgh.

J. C. Deagon, Inc., Chicago, makers of Deagon tower chimes, have sent us a circular giving the essentials of correct chime-tower construction.

THE PARTHENON, ATHENS, GREECE, 1911.